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LUKE AIR FORCE RANGE NATURAL RESOURCES MANAGEMENT PLAN

EXECUTIVE SUMMARY

NATURAL RESOURCES MANAGEMENT PLAN FOR LUKE AIR FORCE RANGE:

EXECUTIVE SUMMARY

PREPARED FOR

UNITED STATES AIR FORCE—TACTICAL AIR COMMAND
LUKE AIR FORCE BASE, ARIZONA

by

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 832D AIR DIVISION (TAC)
LUKE AIR FORCE BASE AZ 85309-5000

OFFICE OF THE COMMANDER

To the People of Arizona and Users of the Luke Range

1. Luke Air Force Base is proud to present the Luke Air Force Range Natural Resources Management Plan, which is the most comprehensive and ambitious natural resources initiative in the Air Force today. This document is a comprehensive plan which defines the full extent of resource planning needs for the Luke Air Force Range and establishes a framework for coordinating and directing resource management activities.

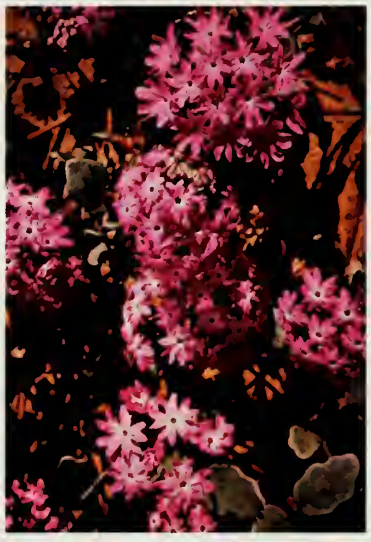
2. Natural resources on Air Force lands comprise a large portion of the nation's total natural resources. The defense mission does not reduce the Air Force's obligation to act as a responsible steward for these lands and resources. The Luke Air Force Range Natural Resources Management Cooperative Agreement of 1982 was the first step in meeting our natural resources management obligations.

3. In the Cooperative Agreement between the Air Force, Navy/Marine Corps, U.S. Fish and Wildlife Service, Bureau of Land Management, and the Arizona Game and Fish Department, the Air Force accepted responsibility to prepare a Management Plan that would integrate and facilitate the management of Luke Air Force Range as an interrelated unit. Luke AFB invoked the Intergovernmental Personnel Act (IPA) of 1970 to acquire the services of the University of Arizona School of Renewable Natural Resources personnel to work directly for the Air Force in developing the Luke Air Force Range Natural Resources Management Plan.

4. This plan is the result of over three years of intensive research, cooperation and coordination between the many users of the Luke Air Force Range. The effort has been a most significant undertaking because natural and cultural resources of the Range are vital national assets which are inherent to the strength of our national defense.

Billy G. McCoy

BILLY G. McCOY
Brigadier General, USAF
Commander



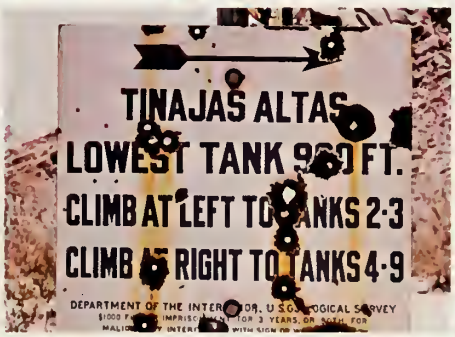
NATURAL RESOURCES OF LUKE AIR FORCE RANGE

Top row to bottom row, left to right:

Screech owl
Saguaro cactus in bloom
Diamondback rattlesnake
Cristate saguaro
Barrel cactus in bloom
Organ pipe cactus
Sand verbena
Mountain lion
Raven Butte at dawn
Desert bighorn sheep
Coyote
Cabeza Prieta Mountains
Pinacate beetle
Sand verbena and white primrose
Giant desert hairy scorpion
Prickly poppy with beetle

DANGER
MILITARY RESERVATION
NO TRESPASSING
DANGEROUS EXPLOSIVES
VIOLATORS WILL BE SUBJECT TO
PROSECUTION 18 U.S.C. 1382
PELIGRO
RESERVACION MILITAR
NO TRESPASAR
EXPLOSIVOS PELIGROSOS
VIOLADORES SERIA PROSECUCION

MUNITIONS RESIDUE
BURIAL SITE
DO NOT REMOVE OR ADD
MATERIAL WITHOUT
PROPER AUTHORITY


TINAJAS ALTAS
LOWEST TANK 960 FT.
CLIMB AT LEFT TO TANKS 2-3
CLIMB AT RIGHT TO TANKS 4-9
DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY

180

HUMAN USES ON LUKE AIR FORCE RANGE

Top row to bottom row, left to right:

Manned range tower

Warning sign on Range boundary

O'Neill's grave

Cabeza Prieta Tanks

Munitions burial site

Four-wheel-drive vehicle and recreationist on El Camino del Diablo

Damage caused by off-road vehicle travel

Tactical target and bomb debris

Prehistoric petroglyph

Jettisoned aerial tow target

Can dump at historic mine

Monument built by Boy Scouts at Tule Well

USGS directional sign

Historic grave marker

Grave stones commemorating pilots killed in Range accidents

USMC Hawk missile firing

International boundary marker and fence

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PREFACE

This document is an excerpt from the Natural Resources Management Plan for Luke Air Force Range. That larger publication, containing 19 chapters, is in limited distribution. This Executive Summary, which is identical to the first chapter of the complete Plan, provides the reader with an overview of the significance and condition of natural and cultural resources on the Luke Air Force Range (LAFR), past and present land uses, and the status of past and present resource management. Further, the Summary presents the most important findings, functions, and recommendations of the Plan. That Plan is a guidance document that outlines methods for the U.S. Air Force to employ in its role as the coordinator of multiple agency use and management of the Range. The most important changes recommended by the Plan are (i) the formulation of a new administrative-management framework through which the several agencies involved with or influencing resources on the Range can interact in a systematic fashion and (ii) the adoption of common resource management goals by LAFR agencies. This Summary contains a complete listing of the management goals and an overview of the framework and its basic functions. If additional details about these or any other components of the Plan are needed, the reader is referred to that document. This Summary should provide sufficient information about LAFR that the purpose and major functions of the NRMP will be apparent.

During the preparation of this Plan, work began in Congress on a new withdrawal bill for LAFR. That bill was passed just prior to the adjournment of the 99th Congress in October 1986 while this document was in press. The new law consolidates the withdrawal of the 2,664,423-acre Range in one legal instrument and has a duration of 15 years. Mining, mineral leasing, and geothermal development and other forms of appropriation, such as agriculture or livestock grazing, are excluded from the Range (including the Cabeza Prieta National Wildlife Refuge). These exclusionary provisions continue the historic policies that have been fundemental to management of the Range since its creation during World War II. Responsibility for land management on the Range, outside of the Wildlife Refuge, has been assigned to the Secretary of the Interior. The Bureau of Land Management is the operative agency of the Department of the Interior in this case.

This Plan correctly assumed that the Range would remain closed to economic development. A further assumption, as outlined in Chapter 2 of the Plan, is that the Air Force, not the BLM, will be the principal agency responsible for day-to-day management of natural resources. This assumption still appears advantageous to both agencies for practical reasons related to the operation of the Range. To insure this status, the cooperative agreement between these agencies may need revision.

A final but very notable change specified by the new withdrawal legislation is redesignation of the Range as the "Barry M. Goldwater Air Force Range" in recognition of Senator Goldwater's long service to his country as an Air Force officer and pilot and as a memeber of the U.S. Senate. The Senator helped lay out the boundaries of the Range when he was a lieutenant with the U.S. Army Air Corps in World War II.

The changes specified in the new withdrawal came too late to be incorporated directly into this document. Contingencies for these changes and others have, however, been outlined in this NRMP and the intent and purpose of the Plan and the shared agency responsibilities for environmental stewardship are preserved.

Many individuals representing a wide spectrum of expertise contributed to the development of this Plan. Their efforts are collectively and gratefully acknowledged here. These contributors and their respective agencies are individually identified in the complete plan.

1.1 INTRODUCTION

Luke Air Force Range (LAFR) is an important military facility, used principally for aircrew training. This expansive Range (4,163 square miles) also contains some of the nation's most unique and well-preserved native desert. Found here is a dramatic landscape of rugged mountain ranges and broad alluvial valleys that have experienced only scattered settlement since late prehistoric times. The Range is one of the hottest and driest deserts of North America. But well-adapted plant and animal life is abundant. The vegetation is that of the Sonoran Desert, typically characterized by the giant saguaro cactus. Also present are various forms of barrel, cholla, and prickly pear cacti, organ pipe cactus, agave,

ocotillo, creosote bush, and palo verde, mesquite, and acacia trees. Over 400 taxa of vascular plants have been identified. Wildlife resources are represented by at least 62 species of mammals, over 200 species of birds, 5 amphibian species, and 37 species of reptiles. Although reptiles and small rodents are often viewed as the typical desert dwellers, LAFR is also home to two highly important mammal species. The survival of the endangered Sonoran pronghorn, in the United States, is dependent on habitat unique to the Range. Also of special note is the desert bighorn that occupies the mountain slopes of the Range.

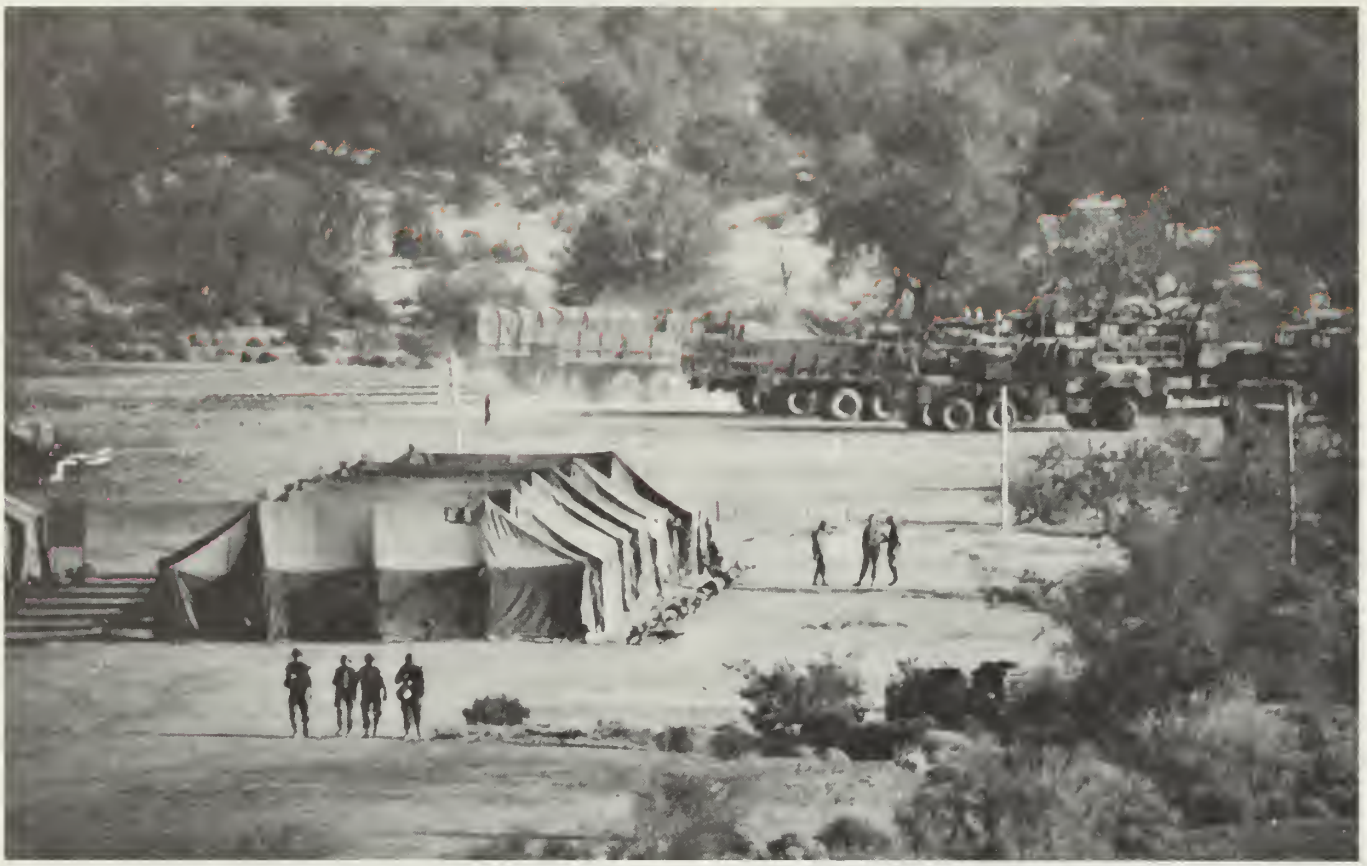
LAFR has long been a crossroads of human wanderings. Evidence suggest that as early as 11,000 years ago hunters may have stalked mammoth and other large mammals on the Range. Since that time, various groups of prehistoric peoples have visited and used the area. Cultural remains from these early visitors are scattered throughout the Range. LAFR also became an important travel route for Spanish explorers and American pioneers. The hot, harsh climate and rugged terrain soon lent the name El Camino del Diablo (the Road of the Devil) to the most frequently traveled route along which many perished. The Camino is today a national historic landmark.

Much of the relatively undisturbed character of the LAFR environment is owed to the military reservation that has excluded a variety of land practices (such as mining, livestock grazing, agriculture, and intensive recreation) that have significantly altered surrounding areas. Although some military practices have been destructive, historically the preponderance of those impacts have been restricted to specific target and other use zones; most of the area has remained undisturbed. The protective aspects of military use for the Range environment have become strained, however, as the cumulative impacts from expanding military and nonmilitary uses have taken their toll on the area's natural and cultural resources.

Recognition of these environmental threats has led to the formulation of the "Luke Air Force Range Natural Resources Management Cooperative Agreement" (NRMCA) between the U. S. Air Force (USAF), the U. S. Navy/Marine Corps (USN/USMC), the U. S. Fish and Wildlife Service (USFWS), the Bureau of Land Management (BLM), and the State of Arizona Game and Fish Department (AGFD). This 1982 agreement was developed to improve the efficiency of resource conservation and management on the Range. In response to the directives of that agreement, this Natural Resources Management Plan (NRMP) has been developed for LAFR by the School of Renewable Natural Resources, College of Agriculture, University of Arizona in conjunction with Luke Air Force Base (AFB). Plan development began in 1983. This NRMP provides the Air Force with the basis for proper management of the natural and cultural resources of LAFR, and a means to effectively coordinate the cooperative efforts of the NRMCA agencies.

Military Use Overview

Luke Air Force Range, located in the extreme southwestern corner of Arizona (Map 1.1), has been an important facility for training pilots in aerial and air-to-ground combat since 1941. Initially established on approximately 1.1 million acres, the Range was quickly expanded during World War II to include about 2.1 million acres, and was enlarged again in 1962 to its current size of 2,664,423 acres (see Chapter 3, NRMP). LAFR is highly valued for its year-round flying weather and expansive, unencumbered air and land space that can accommodate a variety of military training needs. This combination of features is unequaled elsewhere in the continental United States. As urban and other development

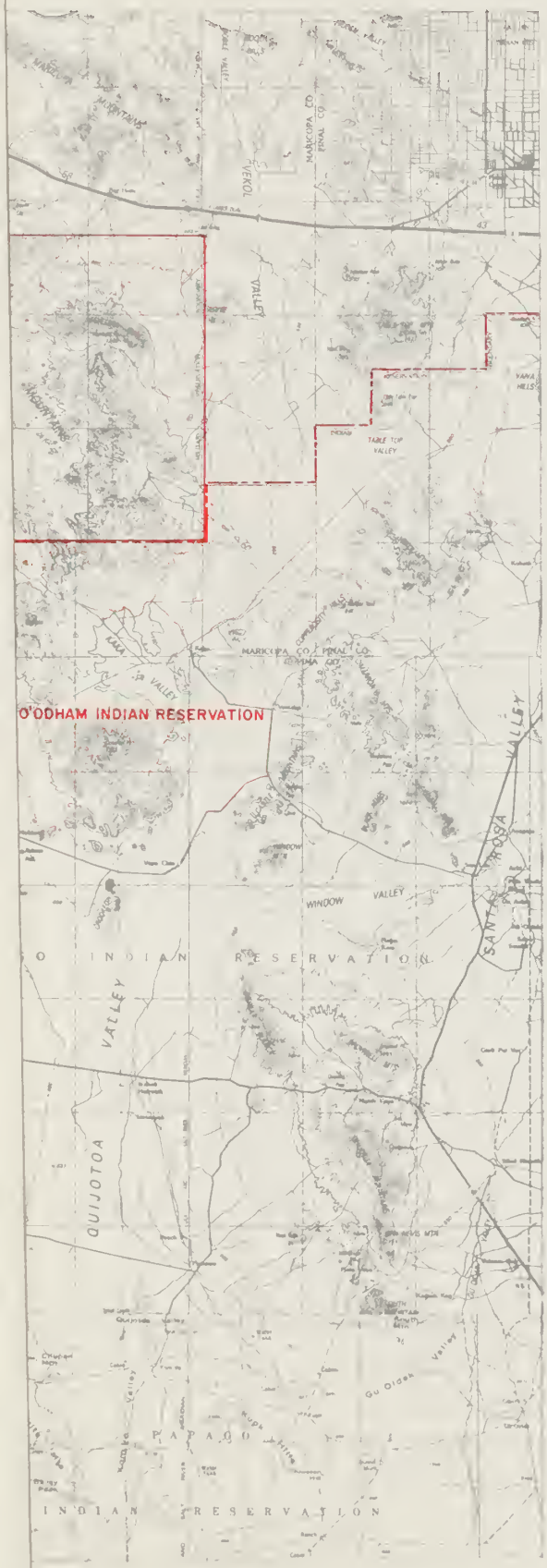


pressures force restrictions on the operation of military aircraft at other range locations, LAFR will become increasingly vital to the nation's defense.

The Range is administered by the Tactical Air Command (TAC) of the USAF through Luke AFB, Arizona, but is jointly operated by the Air Force and the USN/USMC. Two military-use segments have been established on the Range to segregate USAF and USN/USMC operations (Map 1.2). Aircrew training continues to be the primary military use of the area. Other uses include readiness training for an air defense missile battalion, development and testing of basing systems for ICBMs (Intercontinental Ballistic Missile), and other special programs for military training and development. Future use of the Range could include continued operation and gradual expansion of various target and flight ranges, development of new targets and training areas, proliferation of roads, and deployment of a defensive ICBM system.

Natural Resource Significance

The importance of the LAFR environment has been signified in a number of existing and proposed land status designations (see Chapter 3, of this Plan). Almost one-third of the area destined to become part of the military reservation was designated in 1939 as the Cabeza Prieta National Game Range (later renamed the Cabeza Prieta National Wildlife Refuge—CPNWR). The Refuge, administered by the USFWS, was established to provide protection to the desert bighorn sheep and other indigenous species including the Sonoran pronghorn. Three state natural areas (SNA) were designated in 1982 in the non-Refuge portions of the Range. Included in these SNAs are the Tinajas Altas Mountains, the Mohawk Mountains and Sand Dunes, and the Crater Range. These areas received SNA status because they are outstanding examples of important ecosystems and geologic features in Arizona. Among the land status designations that have been proposed for LAFR are wilderness classification for and expansion of CPNWR, establishment of a Yuma Dunes SNA, and inclusion of CPNWR and other parts of the Range in an international biosphere reserve that would also contain adjacent park lands in Mexico and Organ Pipe Cactus National Monument (OPCNM).

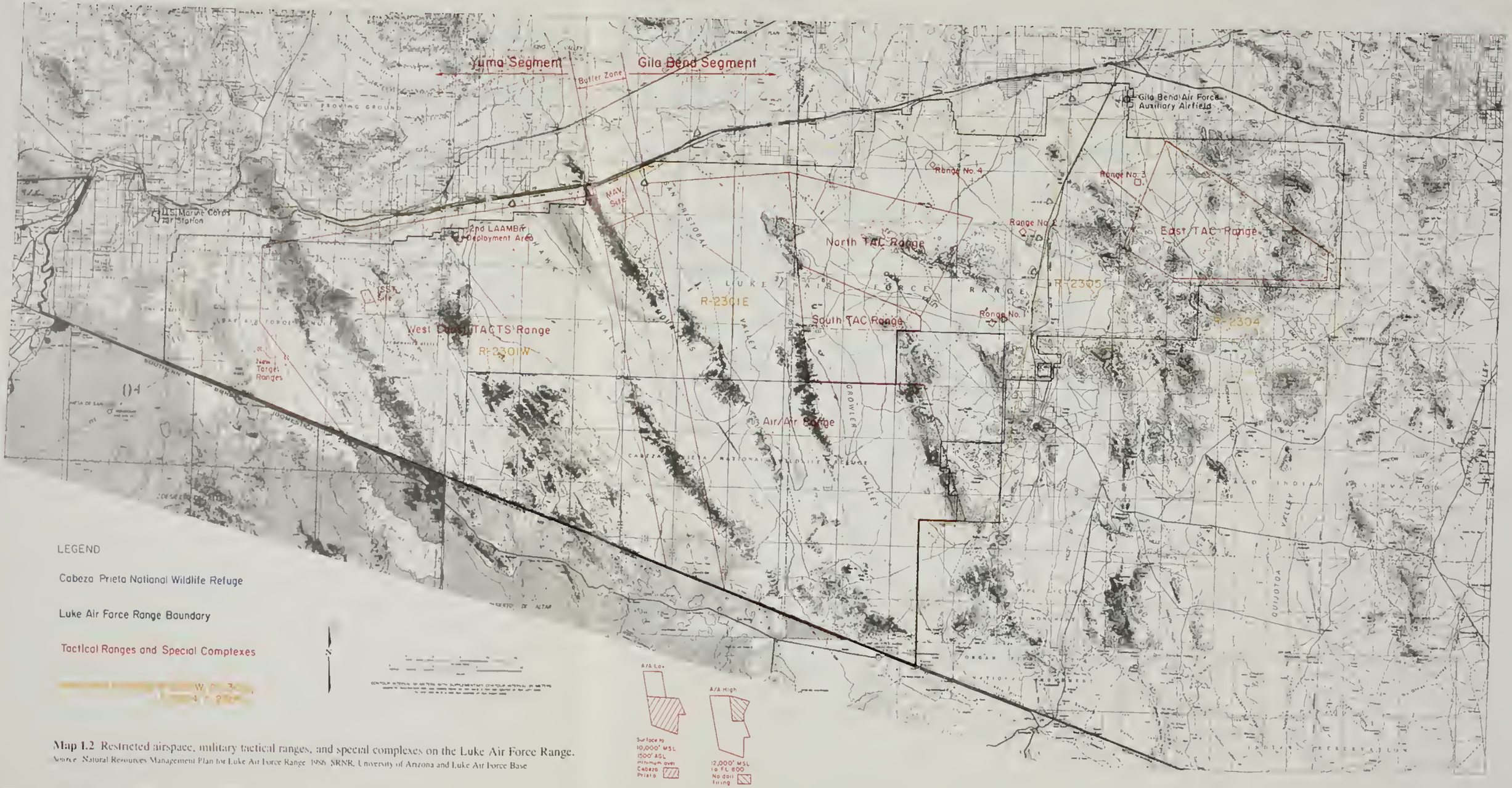

MARICOPA CO.
PINAL CO.
VERDE
VALLEY
TABLE TOP VALLEY
MARICOPA CO.
PINAL CO.
COLVILLE CITY
VALLEY
O'ODHAM INDIAN RESERVATION
SANTA ROSA VALLEY
WINDOW
VALLEY
O INDIAN RESERVATION
VALLEY
QUIJOTOA
Gu Oidak
Valley
PAPAGO
INDIAN RESERVATION

KOFA NATIONAL WILDLIFE REFUGE
YUMA PROVING GROUND
LUKE AIR FORCE RANGE BOUNDARY
GILA BEND
WEST COCOPAH INDIAN RES.
EAST COCOPAH INDIAN RES.
LUKE AIR FORCE RANGE
YUMA COUNTY
MARICOPA COUNTY
PIMA COUNTY
CAZEZA PRIETA NATIONAL WILDLIFE REFUGE BOUNDARY
TOHONO O'ODHAM INDIAN RESERVATION
ORGAN PIPE CACTUS NATIONAL MONUMENT
LEGEND
Luke Air Force Range
Yuma Proving Grounds
Organ Pipe Cactus National Monument
Cabeza Prieta National Wildlife Refuge
Kofa National Wildlife Refuge
Tohono O'Odham Indian Reservation
West and East Cocopah Indian Reservation
Standard Public Use Roads including El Camino del Diablo (The Road of the Devil)

Map 1.1 Luke Air Force Range and vicinity

Source: Natural Resources Management Plan for Luke Air Force Range 1986, SRNR, University of Arizona and Luke Air Force Base

VEKOL
VALLEY
MARICOPA CO.
INDIAN
RESERVATION
TABLE TOP
VALLEY
VAIVA
HILLS
MARICOPA CO. PINAL CO.
VALLEY
WINDOW
VALLEY
SANTA ROSA
VALLEY
INDIAN RESERVATION
VALLEY
QUIJOTOA
Gu Oidak
Valley
PAPAGO
INDIAN RESERVATION



Map 1.2 Restricted airspace, military tactical ranges, and special complexes on the Luke Air Force Range.
Source: Natural Resources Management Plan for Luke Air Force Range 1986, SRNR, University of Arizona and Luke Air Force Base

Resource Protection and Management—A Perspective of the Past

The beneficial relationship between the military reservation and resource conservation has contributed importantly to the past protection of much of the LAFR environment. In fact, the Range was identified, in 1976, as "the best major reserve of unspoiled desert in the Southwest...."* This finding reflected both the considerable extent of disturbance in surrounding areas and the fact that many damaging land uses have been excluded from the Range by military use. In comparison to some current activities, past military use of LAFR had limited impact on most of the Range environment.

Since the 1976 publication of the above finding, however, ground-based activities by the military have increased significantly on the non-Refuge portions of the Range. Impacts are most severe in and around designated targets where air-to-ground gunnery and bombing have resulted in considerable disruption or destruction of portions of the desert. Roads used for access to various targets, other facilities, and training exercises have also caused important land disturbances, and have provided opportunity for the proliferation of unnecessary backcountry roads. Additionally, important environmental impacts have also accumulated from other agency and public uses of the Range. The Range still contains extensive areas of unspoiled desert, but these tracts are now principally limited to areas of the CPNWR. Relatively undisturbed areas are also found on mountain slopes and peaks, and on some scattered bajada and valley plains outside of the Refuge, but in contrast to the 1976 report, the environmental quality of the installation has diminished.

*Wachter, B. G., W. B. Bull, and S. J. Reynolds. 1976. The Mojave-Sonoran Natural Region Study. U. S. Department of the Interior, National Park Service, Denver Service Center, Denver, CO. 389 pp.

Resource management on LAFR is presently ineffective owing to several factors. First, dedication of the Range to military use has overshadowed some critical resource problems. Second, as defense agencies, the USAF and USN/USMC have not had the perspective or personnel for resource management. That situation has improved, at least in terms of perspective, but locally, the military still lacks professionally trained resource personnel. And third, management of LAFR is complicated by the involvement, in varying capacities, of up to 35 federal, state, and local agencies. As a result of these factors, no comprehensive system to conserve and manage the resources of the Range has been developed. Pending implementation of this Plan, the Range remains without a qualified, central authority to oversee resource conservation and management, long-term goals to direct such efforts, or a decision-making framework to coordinate the activities of the multiple agencies involved with the Range in a manner responsive to resource needs.

A number of cooperative agreements have been established between the USAF, USN/USMC, USFWS, BLM, AGFD, and some other parties to improve resource management on the Range. The agreements focus the expertise of the appropriate agencies on various management issues (see Chapter 2, NRMP). NRMCA is the most recent and comprehensive of these agreements. This agreement outlines specific administrative and management responsibilities for the individual signatories. Additionally, the agreement supports the function of a Natural Resources Committee, composed of the signatories. The Committee serves as a forum for interagency discussion and cooperation on resource management issues.

Although the management of some resources (for example, wildlife) has been enhanced by the various interagency agreements, the basic problems of central responsibility, appropriate goals, and decision-making framework for comprehensive resource management have not been corrected. In short, the agreements do not constitute a plan for resource management. The absence of a comprehensive management system has allowed significant environmental damage to occur. Some of this damage has been an unavoidable consequence of military and other authorized uses. But, much of the damage has occurred, and continues to occur, because

either the causal activities did not receive prior environmental assessment and authorization or the negative environmental aspects of authorized activities were not controlled or mitigated.

Unauthorized activities (in other words, those not environmentally cleared) often occur on the Range as an extension of routine agency functions into geographical areas that have not been approved for the actions in question. Such transgressions may be as simple as negligent off-road driving by a single vehicle or can involve much more intensive development and disturbance of a site, such as construction of a water catchment or a military staging area. Although individually they may not appear to be noteworthy, collectively such impacts are important.

Improper environmental assessment of many proposed actions by military and nonmilitary agencies has also led to a substantial amount of unwarranted resource damage. The most serious limitations to the assessment process have been inadequate recognition of (i) the interrelationships of various ecological factors; (ii) the full environmental consequences of many proposed actions; and (iii) the requirements of environmental laws and regulations.

Failure to recognize important ecological relationships and consequences is related, in part, to deficient knowledge about the Range environment. Information about the Range environment is inadequate because years of restricted access and the lack of comprehensive management for natural resources have precluded development of appropriate environmental survey and monitoring programs. As a result, the sensitivity with which the broader ecological implications of a site-specific project can be assessed is greatly reduced. Limited information about the Range environment also severely diminishes opportunities to accurately evaluate the cumulative effects of agency actions on natural and cultural resources through time and over geographical space. In contrast to a comprehensive, systematic approach to environmental assessment, the current practice has been to examine proposed actions, or even sequential phases of the same action, as environmentally isolated and independent events. This approach represents a basic misunderstanding of environmental processes and violates aspects of the National Environmental Policy Act, the Federal Land Policy and Management Act, the Endangered Species Act, Council on Environmental Quality regulations, and agency regulations based on those laws and others.

Resource Management Needs—A Future Perspective

With the exceptions of CPNWR and selected wildlife species in the non-Refuge portion of LAFR, natural resource management, including environmental protection, has been generally inadequate and ineffective. There has been too much reliance on the military reservation of the Range as a passive agent for environmental conservation, a benefit that is presently overestimated. Additionally, current management practices are principally reactionary. Management by this approach is too fragmented, leaves many critical resources and events unattended, has no positive direction based on long-term goals, and offers no addressable locus of control or responsibility.

LAFR requires a systematic, planning approach for resource management that is guided by well-defined goals and that clearly delineates responsibilities within a decision-making framework to coordinate multiple agency management and use of the Range. Such an approach would provide important practical advantages. Management would be placed on a footing to anticipate resource and environmental problems, plan appropriate responses, and more successfully direct their outcome. The improved efficiency of such a system would permit examination of a broader range of resource issues and ecological relationships. Such examinations are not presently conducted. More appropriate and effective control of resource use and conservation would result. Reduced conflict with the nonresource management duties of the LAFR agencies would also be accomplished. Further, comprehensive management based on long-term goals would promote protection of resources that are currently undeveloped or unobtainable, but may be of future value.

LAFR is presently dedicated principally to military training and development purposes that exclude many land uses that would potentially conflict with those missions. This use pattern may be altered in the future, however, to permit a broader mix of military and nonmilitary uses. At some currently unforeseeable point, national defense needs could be such that the Range will no longer be needed for military purposes. The military tenure that precedes these scenarios should, therefore, not disrupt resource values needlessly, if those resources can be conserved without impairing the current military mission.

The following are specific requirements for effective resource management on LAFR: (i) designation of a single agency to serve as the central authority for coordinating overall management of the natural and cultural resources of the Range; (ii) implementation of a decision-making frame-

work that accounts for multiple agency involvement in resource issues, and supports a systematic, planning approach to resource management; and (iii) establishment of long-term goals to direct overall management of resources.

Procedures to satisfy the first two of these requirements are outlined later in this Executive Summary. Details of the analyses supporting these procedures are found in Chapter 2 of the NRMP. Also, included in this Summary are goals and recommendations, the third basic requirement, for the management of the broad spectrum of natural and cultural resources on the Range. Detailed resource information and analyses leading to the recommendations presented in this Summary can be found in the corresponding chapters of the NRMP.

Purpose of the Plan

The purpose of this Natural Resources Management Plan is to establish a system and goals for resource management on LAFR. The system provided by the Plan will rely on the cooperative efforts of the USAF, USN/USMC, USFWS, BLM, and AGFD, the signatories of the 1982 NRMCA. The Plan includes a framework for decision-making through which these agencies and other involved parties can identify and resolve current and future management issues facing the Range. Goals are also established as long-term directives for the management of natural and cultural resource.

1.2 PLANNING PROCESS

Development of this NRMP was based on a planning process that included two parts: Phase I - Initial Planning Assessment (April 1983-1984), and Phase II - Management Plan Formulation (April 1984-August 1986) (Figure 1.1).

Phase I examined the full extent of resource planning needs for LAFR, and identified specific steps required to develop a comprehensive NRMP. This one-year initial assessment was necessary for the following reasons: LAFR is very large (4,163 square miles); the area's resources are complex; and there are many federal, state, and local agencies with responsibilities on, or interest in, the Range. Phase I consisted of five major tasks: (i) preliminary examination of the Range, its resources, and the present management setting; (ii) identification of current resource issues and determination of their relative significance; (iii) development of a descriptive outline or "blueprint" for the overall planning process; (iv) development of a data management system for selected resource data adaptable to computer mapping applications; and (v) compilation of the Phase I report.

Planning efforts in Phase II consisted of four major tasks: (i) finalization of management goals and planning objectives; (ii) collection and synthesis of data; (iii) formulation and evaluation of management strategies; and (iv) preparation of this NRMP.

In many respects, the planning process for LAFR has paralleled a general format that has been developed and successfully implemented for a wide variety of public lands under federal and state jurisdictions. The key to the success of such planning operations has lain not only in the process format, but also in the sensitivity with which the process has been adapted to circumstances particular to the planning area. For LAFR, a planning philosophy cognizant of the relationships between military use of the Range, resource conservation and management, and nonmilitary agency missions had to be developed.

Planning Philosophy, Scope, and Time Horizon

Planning for LAFR required recognition of a set of circumstances defined by existing laws, agency missions, regulations, and policies that are collectively unique to the Range. Foremost was acknowledgement of (i) the status of the Range as a military reservation; and (ii) the prior designation of approximately one-third of those lands as the CPNWR. Military reservation of the Range places control of nearly all of the overlying airspace and the lands outside of CPNWR in the hands of the USAF and USN/USMC. Within the Refuge, all land uses (including military activities) must receive prior approval from the USFWS. Although it also has status as a military reservation, the principal land use legally designated for the Refuge is wildlife conservation. Because of safety and security considerations, all access to LAFR, including most of the CPNWR, is subject to military control and use schedules. Additionally, most multiple-uses

usually found on public lands (such as mining and agriculture) have been excluded from the Range due to incompatibility with military activities.

Pursuant to the planning purpose was the formulation of an overall land use and resource management perspective that struck a balance between military use, wildlife conservation, other agency uses and conservation requirements, and other limitations. That perspective proposes that:

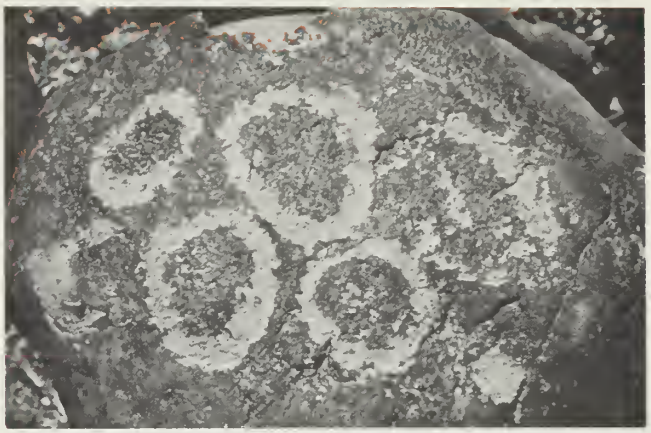
> LAFR should be managed to the greatest extent possible, given current and projected uses by the military, as a natural resource reserve in which natural processes are generally allowed to prevail.

This perspective has been used as a basic planning philosphy for the development of this NRMP and provides an overall purpose for natural resource management on LAFR that has heretofore been lacking. Such a purpose is recommended to provide guidance for continuing land use planning on the non-Refuge portion of the Range. (Planners, managers, and users of the CPNWR have enjoyed the benefits of clearly defined resource purposes for the Refuge. The above perspective is recommended as the basic resource management policy for the remainder of the Range.) As such, this approach will help to conserve sensitive natural and cultural resources, and to preserve other resource values not presently obtainable due to restrictions imposed by military activities or other factors. This approach is also compatible with present military and other agency practices on the Range, within the Refuge, and complies with applicable environmental law.

The term "reserve" is used as a management concept and is meant to insure that natural values and processes are given full recognition in all land use plans. The concept is not intended to be restrictive for those resource management programs, such as wildlife, where a more active management program may be required. Rather, the term suggests that the Range should be reserved, again to the extent possible given the military purposes there, from activities that unduly disrupt natural processes.

The activities, management procedures, and interests of 35 agencies involved with LAFR have been carefully scrutinized within the scope of the planning process. Especially important have been the interests of the five NRMCA agencies. The purpose of these examinations has been to insure that the management procedures and goals recommended in the NRMP accurately reflect the needs of those agencies. A number of federal and state agencies (for example the USFWS and AGFD) already have established management programs for selected lands or resources on the Range. The recommendations within this NRMP are intended to complement rather than supplant those programs, by providing mechanisms for overall coordination of resource management efforts by individual agencies.

This NRMP applies to 2,664,423 federal acres, 84,262 state acres, and 2,675 private acres (state and private lands are



leased by the military) within LAFR. Land practices in areas adjacent to the Range boundary were also examined in order to identify encroachment pressures that may originate from perimeter areas and influence natural and cultural resources of LAFR. Recommendations for responding to such pressures were formulated.

The time horizon, or functional period, of this plan is 20 years. The plan will, however, require periodic updating to keep resource management in step with prevailing circumstances.

Management topics addressed within the plan include water, geology, soil, vegetation, and wildlife; atmospheric, visual, and cultural resources; road system development and use; military and nonmilitary agency use of the Range; recreation management; and perimeter land use and encroachment. Additionally, careful consideration was given to the legal status of LAFR lands and the administrative/management relationships among gagencies involved with the Range. Most resource data and information were obtained from published documents and agency files. Some original field data were collected and analyzed for this NRMP. For example, Map 7.1 (vegetation of LAFR) was based on data collected by the planning team. Field verification of some published results also occurred. For example, previously excavated archaeological sites were re-examined to check for recent signs of disturbance.

Planning Authority and Compliance

This NRMP has been developed in accordance with applicable legal directives and other materials cited herein. In particular, this NRMP has been developed under the authority of the Natural Resources Management Cooperative Agreement and AFR 126-1. The following is a list of the pertinent laws and regulations:

- Air Force Regulations (AFR) 126-1—Conservation and Management of Natural Resources,
- AFR 215—Air Force Moral, Welfare, and Recreation Programs and Activities,
- AFR 215-20—Air Force Outdoor Recreation Program,
- AFR 19-4—Use and Control of Off-Road Vehicles,

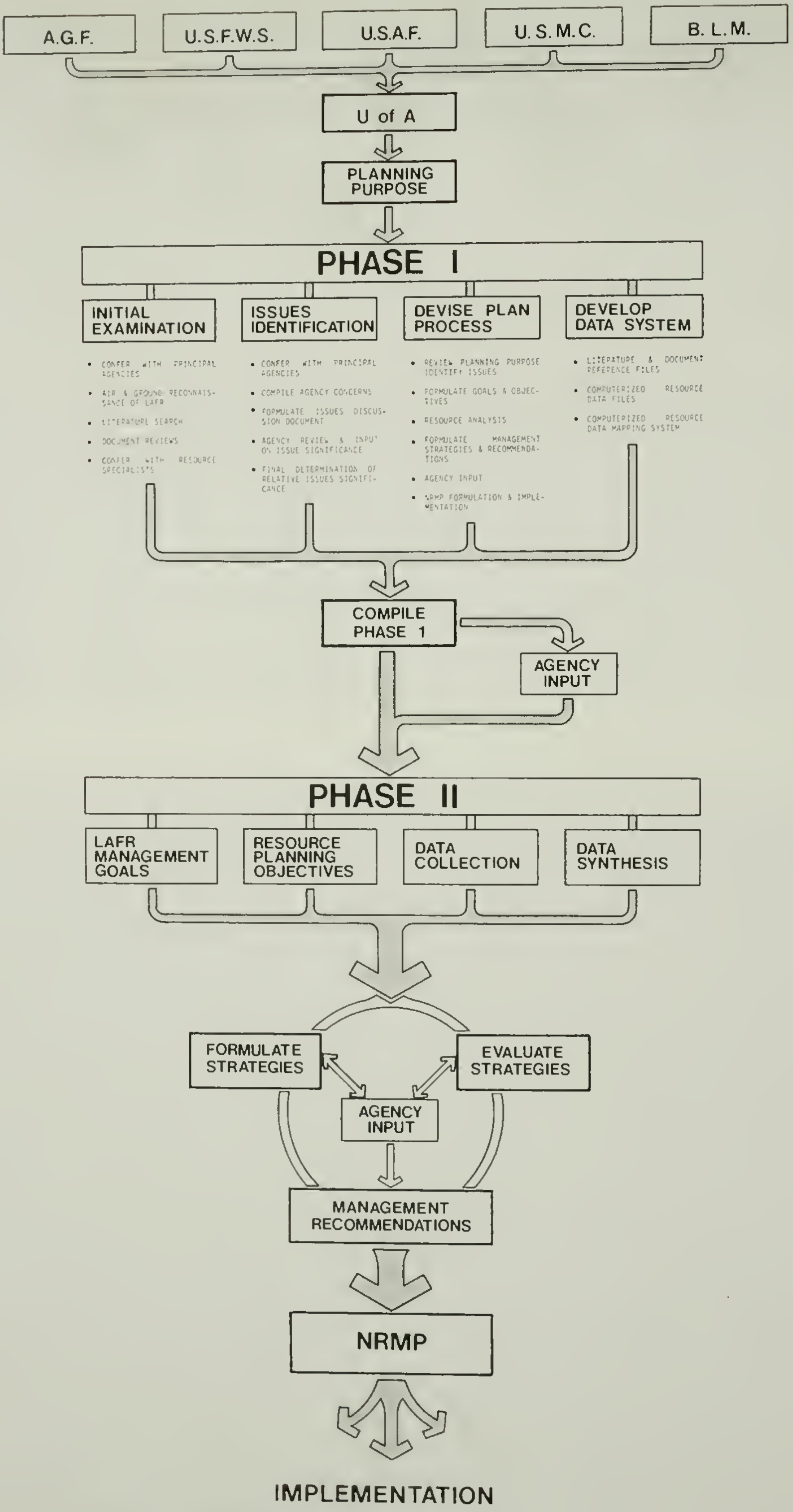


Figure 1.1 Planning process for LAFR.

Source: Natural Resources Management Plan for Luke Air Force Range 1980 (NRMP I) (Luke Air Force Base

- AFR 19-9—Interagency Intergovernmental Coordination of Land, Facility and Environmental Plans, Programs, and Projects,
- Air Force Manual (AFM) 136-5—Natural Resources, Outdoor Recreation, and Cultural Values,
- AFM 126-2—Natural Resources Land Management,
- AFM 126-4—Natural Resources Fish and Wildlife Management,
- Title 32 Code of Federal Regulations (C.F.R.) sec. 217.1 et seq.—Recreational Use of Off-Road Vehicles on DOD lands,
- 32 C.F.R. 213.1—DOD Cooperation with Civilian Law Enforcement Officials,
- 32 C.F.R. 232.1—Natural Resources, Fish and Wildlife Management,
- 50 C.F.R. sec. 25.11 et seq.—The National Wildlife Refuge System,
- Navy Manual NAVFAC MO-100.4—Outdoor Recreation,
- Navy Manual NAVFAC MO-100.1—Land Management,
- Navy Manual NAVFAC MO-100.3—Wildlife Management,
- Refuge Manual—U.S. Fish and Wildlife Service,
- Administrative Manual Part 5 sec. 2—U.S. Fish and Wildlife Service,
- Arizona Revised Statutes Title 17—Game and Fish Laws,
- Hunting Regulations—Arizona Game and Fish Commission, Fall 1985-Spring 1986,
- Luke Air Force Range, Natural Resources Management Cooperative Agreement, 17 August 1982,
- Draft Outdoor Recreation Amendment to the Luke Air Force Range Natural Resources Management Cooperative Agreement,
- Memorandum of Understanding between the Departments of the Air Force/Navy and the Fish and Wildlife Service, 1960,
- Memorandum of Understanding between the Department of the Air Force Department of the Navy, and U.S. Fish and Wildlife Service, 1975,
- Local Agreement Between the Commanding Officer 58th Tactical Fighter Training Wing, Luke AFB, AZ and the Refuge Manager CPNWR, Yuma, AZ, 1976,
- Memorandum of Understanding between the USAF, the USN/USMC, and the State of Arizona Game and Fish Commission, 21 January 1978,
- Cooperative Plan for the Development and Management of Fish and Wildlife Resources on Air Force Installations, 1978,
- Memorandum of Understanding between the DOI and DOD for the Conservation and Management of Fish and Wildlife Resources on Military Installations, 1982,
- Natural Areas Registration Letter of Understanding between Luke AFB and ASPB, 1982,
- Letter of Agreement between Commander, Twelfth Air Force and Commander, Third Fleet, 1982.

Benefits of the Plan

Implementation of this NRMP according to the principles and processes described will yield a number of benefits for the LAFR environment and the agencies involved with the Range:

(i) Multi-agency management of the natural and cultural resources of LAFR will be coordinated in an ecologically sensitive and professionally effective manner.

(ii) The USAF and USN/USMC will be able to more effectively execute their defense-related missions by identifying and addressing resource management issues before these become so complex that they significantly interfere with military operations.

(iii) The USAF will be better prepared to carry out its custodial and legal duties with regard to the natural and cultural resources of LAFR.

(iv) Civilian resource management agencies having LAFR responsibilities will be able to more efficiently and safely execute their own missions.

(v) An improved atmosphere of understanding and cooperation will develop among the numerous federal, state, and local agencies having responsibilities for the Range.

(vi) The Plan will be useful for orienting new agency personnel to the Range environment, its resources, and their management.

(vii) Future challenges to, and questions about, resource management on LAFR can be placed in perspective by reference to the NRMP. Once officially adopted, the Plan will merit formal recognition by the presiding hearing officer or judge in any relevant legal proceeding.

(viii) Public opinion about the intent of the NRMCA agencies to responsibly administer the lands and resources within Like Air Force Range will improve. For example, existence of the Plan will indicate that the USAF takes its land stewardship role seriously.

1.3 PLANNING EVALUATIONS

Evaluations contributing to the development of this NRMP can be subdivided in two ways. First, there have been considerations of agency activities, jurisdictions, and responsibilities as they apply to LAFR and to the management of its natural and cultural resources. These analyses have led to recommendations for a new framework incorporating multi-

ple agency participation in the management of the resources of the Range. The second set of evaluations pertained directly to the management of the various resources of LAFR. Findings from these examinations were used to formulate recommendations for the management of specific resources (for example, water, mineral, and cultural resources). Presented below is an overview of the analyses that were conducted in support of the recommendations for a new administrative-management framework. That framework is presented in Section 1.4 of this Executive Summary. Details of its development appear in Chapter 2. Recommendations for resource management and a synopsis of the supporting analyses follow in Section 1.5 of this Summary.

Agency Jurisdictions and Activities

The approximately 35 federal, state and local agencies involved with LAFR represent a wide variety of jurisdictions and interests in land ownership and uses, public access, law enforcement, resource management, and military activities. Each agency has individual policies and managerial functions that, when applied in conjunction with other LAFR agencies, creates a jurisdictional and administrative environment that is highly complex. This complexity must be accounted for if resources on the Range are to be effectively managed. Below is a brief description of the jurisdictions and activities of the agencies with the most relevant involvement on the Range. Greater details on these agencies and others not identified here are presented in Chapters 2, 12, and 13 of the NRMP.

U.S. Air Force (Luke AFB) and U.S. Navy/ U.S. Marine Corps (MCAS, Yuma)

The Air Force has jurisdiction for the entire Range, but shares responsibility for military operations with the USN/ USMC. The Air Force maintains exclusive control of operations in the Gila Bend Segment of the Range. The USN/ USMC controls operations in nearly all of the Yuma Segment (Map 1.2). Two facilities, the ISST (ICBM Silo Superhardening Technology) and MAV (Multiple Aim-Point Validation) sites, for development and testing of basing modes for ICBM's, are operated on LAFR by the Ballistic Missile Office of the USAF (see Chapter 12). The ISST site is located east of the Gila Mountains in the Yuma Segment. The MAV site transects the Yuma-Gila Bend Segment boundary just east of the Mohawk Mountains (Map 1.2).

Within their respective segments, the USAF and USN/ USMC have authority and responsibility to control all land access outside of the CPNWR. They also have the authority to close access to the Refuge when air-to-air gunnery, or other aerial activities pose an endangerment to persons on the ground. This authority has important implications for resource management, because agencies, or other parties, entering the Range for that purpose must comply with the access schedule permitted by the military. Access to most portions of the Gila Bend Segment including CPNWR, can be highly restrictive, at least during week days (Map 1.2). These limitations are necessary, due to the many air-to-ground gunnery and bombing and air-to-air gunnery ranges that the Air Force routinely uses in the segment. (No air-to-ground gunnery or bombing is presently permitted in the CPNWR). Access to most parts of the Yuma Segment is more readily available. The only live-fire targets are limited to the southwestern corner of the area.

The USAF and USN/USMC schedule all use of the restricted airspace overlying most of LAFR (Map 1.2). In general, military control and use of the airspace extends from the ground surface to 80,000 feet above mean sea level. Military aircraft operations are, however, restricted to 1,500 feet above ground level over CPNWR. Aircraft use for resource management purposes on the Range must be approved by the USAF or USN/USMC. As with ground access, military operations have priority over civilian (public or agency) requests to enter the restricted airspace over LAFR.

USAF and USN/USMC pilot training activities on LAFR are similar. Both agencies train fighter pilots for various air combat and ground attack roles. Combinations of "bull's-eye" targets to score pilot proficiency in bombing and strafing, mock airfield and other tactical targets to simulate ground attack missions, and air-to-air combat ranges are used in both the Air Force and USN/USMC training programs. The Air Force also uses the Range for live-fire training. Low yield practice bombs and rockets and inert cannon ammunition are used for most missions. Some high explosive ordnance is occasionally dropped at certain designated

locations in the Gila Bend Segment. The USN/USMC has minimal requirements for live-fire on LAFR and restricts those exercises to practice ordnance. Training with high yield ordnance is accomplished by USN/USMC pilots at another range in southern California. Instead, on LAFR, this agency uses a number of electronically scored, "no bomb drop" targets that simulate the trajectory of the intended ordnance.

Routine users of the Gila Bend Segment of the Range include units from Luke, Williams, and Davis-Monthan AFBs (Arizona) and Arizona Air/Army National Guard and Air Force Reserve Units. Other Air Force and Guard units from around the nation are also periodically assigned to LAFR. The Yuma Segment is used by Navy and Marine Corps pilots from MCAS, Yuma, and Miramar Naval Air Station and other air stations in California.

In addition to being a joint user and operator of LAFR, the USAF is also responsible for environmental protection and resource management on the Range. By agreement with the USN/USMC, this obligation includes both the Gila Bend and Yuma Segments. The Air Force is accountable for environmental impacts in CPNWR caused by military operations. But, resource management within the Refuge remains the responsibility of the USFWS. As noted previously, Air Force efforts for responsible land stewardship have included cooperative agreements with the USFWS, AGFD, BLM, and the Arizona State Parks. The USN/USMC have been directed to ensure that their operations on the Range comply with applicable environmental laws and regulations. All proposed actions by this agency, incorporating LAFR lands must receive prior approval from Luke AFB. Both the USAF and USN/USMC are also party to several cooperative agreements that promote natural resource management on the Range.

U.S. Fish and Wildlife Service (CPNWR)

The USFWS has jurisdiction for CPNWR and controls all access to that part of LAFR used by the public as well as military and nonmilitary agencies. Except in the case of emergencies related to lost aircraft, military personnel must obtain approval, under a Special Use Permit, from the Refuge manager before entering the Cabeza Prieta. All access to the eastern portion of the Refuge can be scheduled only during periods when the overlying air-to-air range is not being used for gunnery practice.

The USFWS is unique among the five signatory agencies of NRMCA in that this agency has near autonomy for resource management on about 31 percent of LAFR. This position provides the Service with an opportunity to plan and implement long-term, comprehensive strategies for managing Refuge resources. The Service also has the chance, through NRMCA, to influence the outcome of important decisions about land uses on the non-Refuge portions of the Range.

This is particularly important when proposed activities on lands adjacent to CPNWR might impact resources on the Refuge. These opportunities, which provide for consistency in management, are important for maintaining the natural integrity of the Refuge. Management consistency is critical, because many of the environmental processes within the Sonoran Desert occur over long time-spans. Management programs that cannot be scaled for similar time-spans often are ineffective.

In addition to its administrative duties for the Refuge, the USFWS advises the Air Force and other agencies on wildlife management matters pertaining to the rest of LAFR. In particular, the Service participates with the USAF, AGFD, and National Park Service (NPS) in recovery efforts for the endangered Sonoran pronghorn antelope.

Bureau of Land Management (Phoenix District)

The BLM (formerly the Public Land Office) can be viewed as the originating administrative agency for the non-Refuge lands comprising the Range. If the withdrawal of LAFR were discontinued, these lands would revert to the BLM. At present, the BLM continues to retain some management functions for the Range. Administration of withdrawal instruments, withdrawal renewal processes, mining and mineral leasing proposals, and livestock grazing proposals are among those functions. Because mining, mineral leasing, and livestock grazing are currently prohibited on LAFR, administration of these land uses can be considered as a vestigial responsibility of the BLM pending the potential renewal of these activities in the future. An additional function of the BLM could involve the Cadastral Survey Office of that agency. This office has the legal authority to survey disputed federal boundaries and would be employed should such an issue arise on the Range. The BLM, a signatory of NRMCA, also serves as a resource management advisor to the USAF. Finally, the BLM manages land adjacent to the LAFR boundary. The Yuma District office is responsible for most BLM lands in Yuma County; the Phoenix District office manages agency lands in Maricopa County and some in Yuma County.

U.S. Border Patrol (Yuma, Tucson, and Substation Offices)

The U.S. Border Patrol (USBP) enforces laws against the illegal entry into the United States along the 90-mile-long international boundary on LAFR's southern side. For this reason, the USBP conducts frequent aerial and ground patrols throughout extensive areas of the Range. The USBP is not involved in resource management on LAFR, but the necessity for this agency to drive off roads and to construct and maintain "drags" (wide, bladed roads extending for miles across valley plains used to detect the foot traffic of undocumented aliens) causes important environmental impacts. Many intercepts are also lifesaving efforts to rescue aliens who grossly underestimate the rigors of the LAFR terrain and heat. The immediacy of the intercept, by means of off-road driving, is often critical to the success of the lifesaving effort.

U.S. Customs Service (Lukeville and Yuma Offices)

Customs officials enforce laws against carrying contraband into the United States. Although the agency does not conduct patrols on LAFR, an occasional interception of a smuggling operation does occur there.

Arizona Game and Fish Department (Phoenix, Yuma, and Field Offices)

Wildlife on federal property in Arizona is considered to belong to the state. Accordingly, cooperative agreements have been established between the USAF, USN/USMC, and AGFD for wildlife management on the non-Refuge portions of LAFR. AGFD is also a signatory of NRMCA. The principal activities of this agency on the Range include bighorn sheep and other wildlife surveys, setting of hunting quotas, administration of legal hunts, game law enforcement, development and maintenance of wildlife waters, and wildlife research. This agency leads the Sonoran pronghorn antelope recovery team. On CPNWR, the chief duties of AGFD are co-administration, with the USFWS, of the annual bighorn sheep hunt (the only hunting permitted on the Refuge) and enforcement of state game laws. While AGFD has wildlife management jurisdiction on LAFR, it does not have authority for land or habitat management. Permission for such activities must be gained from the USAF or USFWS.

Arizona State Land Department (Phoenix Office)

The Arizona State Land Department (ASLD) is technically responsible for the management and development of all state lands and for generating revenues for the state school fund from these properties. There are 84,262 state acres in LAFR that are leased through condemnation by the USAF. This lease process closes these state lands to all forms of entry and development, other than that authorized by the Air Force, including mining and mineral leasing. The Air Force is responsible for resource management on these lease lands. ASLD remains interested in the future of state lands within the Range for potential sale or trade to the Air Force or for civilian use should the military withdrawal be discontinued.

Arizona State Parks Board (Phoenix Office)

The ASPB administers the Arizona State Natural Areas Program. Three SNAs (previously noted) have been designated within LAFR with the concurrence of the USAF. The Board continues to support stewardship practices within these SNAs that protect the natural values for which they were designated. A fourth SNA, the Yuma Dunes, is proposed by the Board. Another SNA was previously proposed for the Sentinel Plain volcanic field but has not been established.

County Sheriff's Departments (Yuma, Phoenix, Tucson, and Substation Offices)

LAFR lies within Yuma, Maricopa, and Pima counties. Each county sheriff's department has jurisdiction for civilian law enforcement within its portion of the Range. These agencies do not patrol the Range, but do respond to requests from other LAFR agencies for law enforcement assistance, criminal investigations, and search and rescue operations.

Assessment of the Administrative-Management Problem

Establishment of a central management authority, development of a decision-making framework, and formulation of long-term management goals have been cited in this NRMP as prerequisites for initiating an effective system for the overall administration and management of LAFR's resources. Resource management goals have been developed within this NRMP and are presented in Section 1.5. Undetermined, however, are a central authority for management natural resources and a decision-making framework for implemening that management. The factors influencing these determination are examined below.

Central Management Authority

The Air Force is the pivotal agency for coordinating overall management of natural and cultural resources on LAFR. This conclusion follows principally from USAF jurisdictions for the Range, which are broader than the authorities of other NRMCA members. Important Air Force jurisdictions include (i) administration of the entire military reservation and approval authority for most aspects of its operation; and (ii) control of land use decisions and authority to grant environmental clearances for all actions on non-Refuge lands.

USFWS responsibilities for CPNWR also represent multifaceted jurisdictions that apply to a sizable portion of LAFR. The considerable autonomy of the Refuge suggests that these lands will remain as an independently administered unit, within LAFR, in terms of land use and resource management.

The autonomy of the USFWS poses no problem for resource management on LAFR. Through its jurisdictions, the USAF could effectively coordinate land use and resource manage-

ment on non-Refuge lands to be compatible with the purposes and programs occurring on CPNWR.

In contrast to the Air Force, the USN/USMC, AGFD, and BLM do not have the jurisdiction to coordinate comprehensive resource management on the Range. USN/USMC authorities for LAFR lands are limited principally to roles as point users/operators of the Western Section. As noted previously, land-based actions by this agency must be environmentally approved by the Air Force. AGFD has wildlife management authority on LAFR, but does not have jurisdictions for other land uses. And, as noted above, present BLM authority for LAFR lands is very limited.

Resource Management Expertise. Deficiencies in expertise presently limit the Air Force's ability to respond to applicable regulations and laws pertaining to resource management and environmental protection. Cooperative agreements with the USFWS and AGFD have helped to compensate for the lack of Air Force expertise on wildlife issues. The USAF remains ill-equipped, however, to adequately meet the planning and management needs for cultural, geologic, water, soil, vegetation, recreational, and other resources. The provisions of NRMCA help fill some of these needs by laying the groundwork for incorporation of additional assistance from the USFWS, AGFD, and BLM. This assistance is restricted, though, by jurisdictional, personnel, budgetary, and motivational constraints on the part of these nonmilitary agencies to contribute to LAFR management. In spite of NRMCA, LAFR remains without adequate resource management.

Employment of resource professionals, as Air Force staff, is the best means of upgrading resource management on the Range and maintaining its continuity with the military mission, which by law is preeminent. Obviously, the Air Force will not be able to establish a management program on a par with that of the BLM or other land management agencies. The agency should, however, establish a special staff of natural resource professionals to administer the comprehensive management program outlined in the NRMP, and to coordinate the cooperative efforts of NRMCA agencies. This staff would not supplant the responsibilities of the other NRMCA agencies (the USFWS and AGFD in particular). Instead, the staff would serve to supplement their efforts by assuring that various agency actions are coordinated to be as noninterfering and, preferably, as complementary as possible. More details on the recommended composition and recommended functions of a resource management staff are presented in Section 1.4.

Resource Management Motivation. Agency motivations for investing personnel, funding, and materials in resources on LAFR vary considerably. Although the USAF and USN/USMC must comply with applicable environmental laws, these agencies do recognize that their privilege to operate military programs on the Range depends, in part, on responsible land stewardship. Presently, the resource programs of these agencies are limited to (i) compliance with NEPA and other environmental laws on some, but not all projects (frequent violations have occurred as undisturbed land areas have been incorporated into expanding military facilities, and nonmilitary projects, such as drag roads or wildlife water catchments have been authorized but not environmentally cleared; (ii) participation in cooperative agreements for wildlife and resource management; and (iii) cooperation, and some material and funding support (on the part of the USAF), for some wildlife projects. This level of investment by the USAF and USN/USMC in natural resource management has not been sufficient in protecting LAFR's resources, and has not been adequate in controlling environmentally damaging activities.

Implementation of this NRMP, assembly of a resource management staff at Luke AFB, and employment of resource specialists at MCAS, Yuma are the logical steps for strengthening the commitment of the USAF and USN/USMC in resource management. By increasing their capabilities in land stewardship through these actions, the USAF and USN/USMC will increase their management motivations. Positive benefits that, at a minimum, would accrue from such investments are listed below:

(i) The USAF will have the basic expertise to realistically act as the lead administrative agency in the implementation of this NRMP.

(ii) The USN/USMC will be able to participate more fully as a member of the Natural Resources Committee.

(iii) With tangible commitments, in terms of personnel, time, and funds, to environmental stewardship, both military agencies will be able to argue more legitimately for continued or additional support for resource management programs.

(iv) The resource personnel within each military agency will be able to help military and other agency planners minimize the resource impacts of various actions; thus, reducing environmental, public relations, and restoration costs while maximizing planning and project implementation efficiency.

(v) Other agencies will invest in resource management and environmental protection measures more enthusiastically knowing, with some assurance, that the military is working affirmatively with them towards those purposes.

Point five, above, should be of particular importance to the USFWS and AGFD. If the military demonstrates stronger support of the interests of these agencies, they will most likely provide greater management assistance to the USAF in areas outside of their standard activities.

Resource Management Direction. Prior to this NRMP, a comprehensive set of management directives, specific to the Range, was not available for LAFR. Some specific policies regarding cooperative actions on resource inventories, environmental assessments, wildlife, and access are found in Section I of NRMCA. Additionally, each NRMCA agency has its own general resource management regulations.

The goals established by this NRMP provide the comprehensive perspective, issing in NRMCA and individual agency directives, necessary to guide resource management in long- and short-term decision-making. Ideally, significant compatibility between long-term goals and short-term objectives will occur. There is, however, a high probability that many of the military and some of the nonmilitary projects will be contrary to at least some of the management goals and applicable environmental protection covenants. In these cases, some compromise may be deemed necessary, but should not be approved until less damaging alternatives have been legitimately considered and methods of environmental mitigation have been identified. This consideration of alternative actions follows directly from NEPA (1969) and numerous federal regulations promulgated due to that Act.

The process of balancing the implications of proposed actions against management goals and potential environmental impacts is the means by which overall, long-term direction is integrated into more immediate resource uses. The actual balancing process, often requiring input from a number of agencies and other sources of expertise, is an essential result of the planning approach to management that is recommended for LAFR.

Decision-Making Framework

Important in the construction of an administrative-management framework for LAFR is the recognition of seven conditions directly related to its potential effectiveness. First, authority to implement decisions must be derived from the jurisdictions of individual agencies. Accordingly, the framework design reflects the complex, multiple agency jurisdictions and missions that apply to the Range.

Second, because most of CPNWR is part of LAFR, resource management on the Refuge is unquestionably part of overall Range management. The USFWS, however, has a significant amount of inherent autonomy for Refuge management. Hence, the framework should be viewed as a formal mechanism for coordinating Refuge and non-Refuge management.

Third, the lead administrator of the framework should be the USAF, a status appropriate to that agency's extensive jurisdiction over the Range. To fulfill its responsibility, the Air Force will need to assemble a balanced resource management staff to provide the necessary expertise to direct and coordinate overall management of Range resources.

Fourth, in the past, the federal environmental assessment process has not always been appropriately included in management decisions on LAFR. Such a review process will be directly incorporated into the decision-making framework for the Range, thus, minimizing the chance that this important and legally mandated procedure will be overlooked.

Fifth, the framework should incorporate a step-by-step process for interagency decision-making.

Sixth, goal-directed management should be fostered by the framework.

And seventh, the existing administrative structures of the individual NRMCA agencies should be incorporated into the framework to avoid proliferation to avoid proliferation of unnecessary bureaucratic levels.

1.4 RECOMMENDED ADMINISTRATIVE-MANAGEMENT FRAMEWORK

A nine-step framework for resource management on LAFR has been assembled based on the preceding assessments (Figure 1.2). Guidance and assistance are available to man-

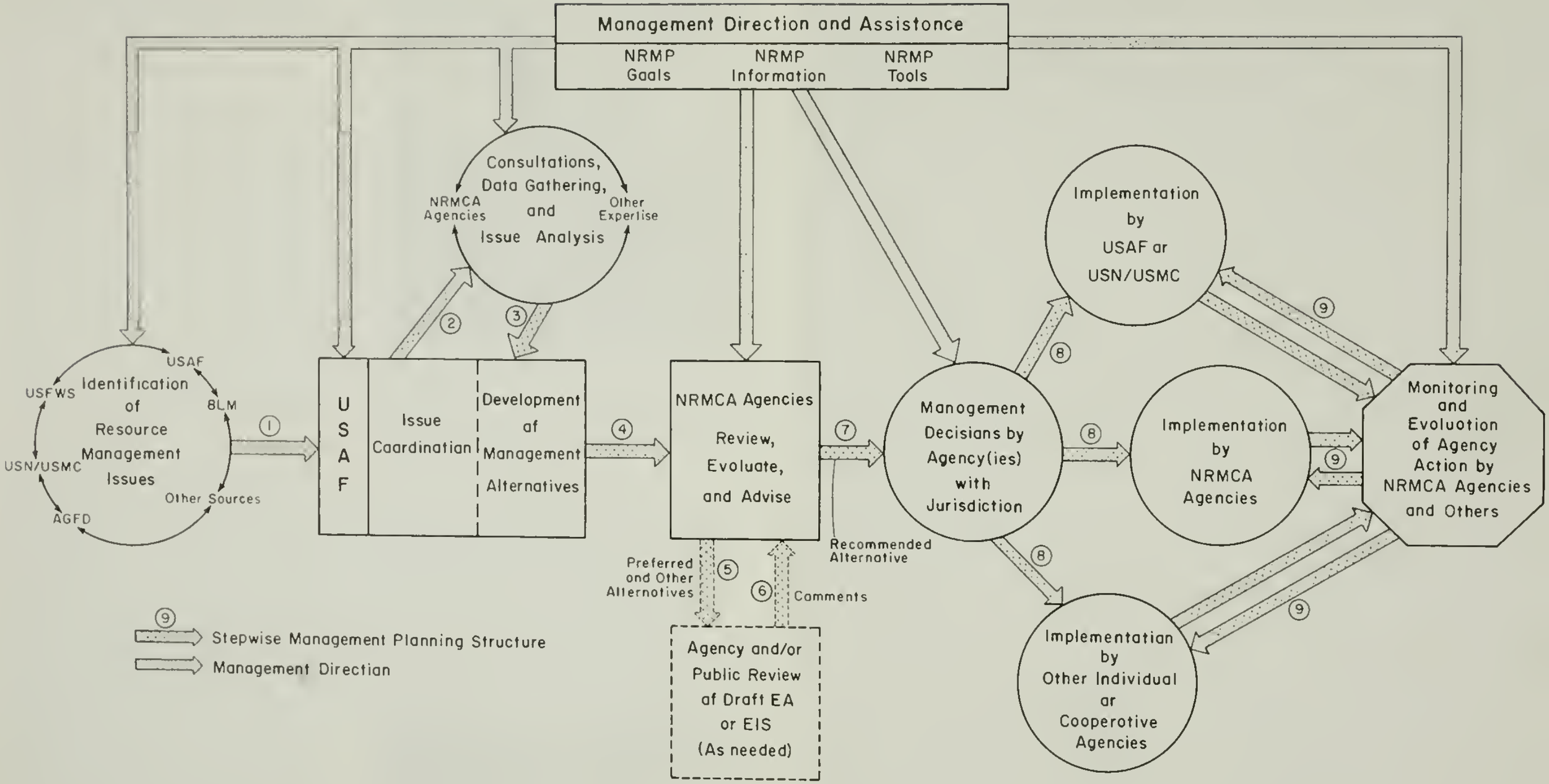


Figure 1.2 Administrative-management framework

Source: Natural Resources Management Plan for Luke Air Force Range 1986. SRNR, University of Arizona and Luke Air Force Base

agement for all critical points in the decision-making structure through references to the goals, objectives, and resource data contained within this NRMP. The individual steps in the framework are discussed below. Following those discussions, specifications for the new resource management staff at Luke AFB are outlined.

Framework Steps

Step One—Issues Identification and Coordination

The proposed administrative-management framework is basically issue-driven. The decision-making process begins with the identification of resource issues pertinent to LAFR. Each issue is then conducted through the multiple-agency decision-making system, including consultation, evaluation, analysis, and resolution as required. Management issues are identified through interactions between the NRMCA agencies and with outside contacts. Although informal communication is often effective in such a process, the Air Force resource staff should take a strong lead in also establishing formal mechanisms for issues identification and coordination. The resource staff should basically serve as an issue clearinghouse. The clearinghouse function is intended to keep the Air Force and all other appropriate parties well advised of emerging issues and the progress of those issues in the framework process. Details of this function are presented in Chapter 2 of the NRMP.

Step Two—Issue Analysis

Examination of the scope, relevance, and implications of an issue for resource management is the second step in the decision-making process. Participants in this process include the NRMCA agencies and possibly other agencies, universities, or private consultants. Analyses would normally begin with consultations among the primary parties involved to "brainstorm" the scope of the issue and its implications for management. References to the NRMP goals and its information base will be important in accomplishing these tasks. Next would be formulation of a plan for further examination, if needed. Such a plan should specify management and analytical objectives, data gathering needs and methods, data analysis techniques, task assignments, and a timetable. The general goal of the above process is to provide the necessary information so that responsible parties may formulate reasonable management alternatives to the issue at hand.

The roles of individual NRMCA agencies could vary considerably during the analytical process, depending on the character of the issue and agency responsibilities. The Air Force resource management staff will have important general duties in addition to specific tasks assigned to them. Coordination of multiple agency functions will fall to the staff, as will the monitoring of analytical progress and adherence to timetables. Most importantly, the staff should insure that NRMP goals are carefully followed. The resource staff should be responsible for making certain that data gathered, organized, and evaluated are carefully and logically recorded in the Range library system to serve as part of a continuing information base for future needs (see Chapter 17, NRMP). In particular, any information that could contribute to the ongoing assembly of information about archaeology, water, soil, vegetation, geology, wildlife, visitor use, or other resources, should be collected in a compatible format.

Step Three—Management Alternatives

Alternatives for resolving a management issue should be based on interagency consultations, results of other analyses, NRMP goals, and other guidelines. Formulation of at least two to three alternatives is expected, depending on the complexity of the problem. The no-action alternative is always to be considered. In all but the most simplified cases, or when a previously proven, reliable solution is clearly appropriate, a third alternative should be provided. A number of other alternatives may also be appropriate in complex situations. At this point in the decision-making process, management

alternatives are in the proposal stage and will receive later evaluation. Each alternative should, nevertheless, be as realistic as possible and should adhere to the NRMP goals for environmental protection.

As indicated by the framework, the USAF is the agency responsible for development of management alternatives. At times, this will clearly be the case as other agencies provide input to the resource staff, which will then formulate alternatives. For example, the staff may receive input on methods to mitigate the impacts of a new target range on natural and cultural resources. The staff would formulate alternatives for review in Step Four. Another agency could take a strong lead in formulating alternatives, if the proposed action lay within its expertise and jurisdiction. For example, AGFD might submit alternative approaches for aerial bighorn sheep surveys. The Air Force would then coordinate a review of the proposals.

Step Four—Agency Review

Interagency review and evaluation of management alternatives developed in Step Three begins in Step Four. The purpose of these evaluations is to provide advice on needed modifications for management alternatives, and to help in the selection, if possible, of a preferred alternative. Such assistance is advisory to the agency with the appropriate jurisdiction to implement the final management decision. It is hoped that some consensus will be achieved. Development of an interagency consensus is the desired outcome of these evaluations. Nevertheless, selection of a preferred alternative by the responsible agency will be necessary, if a public EIS review is planned (Step Five).

The resource staff is expected to coordinate the necessary reviews in Step Four. If the issue is not complex or controversial, a fairly informal review process among involved agencies may be possible. With agreement among those parties, and if EA or EIS preparation is unnecessary, the decision-making process could continue without Steps Five and Six.

Step Five—EA or Draft EIS Review

Preparation of an EA or EIS can follow directly from the preceding four steps. Guidelines and requirements for EA or EIS preparation and review are available in CEQ regulations and those of the federal agency responsible for the documents. EA and EIS review processes for resource management proposals are an optional component of the administrative-management framework (Figure 1.2, Step Five).

Step Six—EA or Draft EIS Comments

Agency and public comments on preferred and alternative management actions should be evaluated by the agency with decision-making jurisdiction, in consultation with the other NRMCA agencies. In this step, the relationship of the management alternatives to the NRMP goals should again be carefully assessed. The product of this interagency evaluation should be a final recommendation, with a concise statement clearly defining the environmental benefits and impacts of the action. Also included should be proposed procedures for mitigating the negative consequences of the action, and recommendations for monitoring the effects of the action.

Step Seven—Management Decisions

Although the framework to this point has emphasized interagency cooperation, the final decision on how to resolve a resource issue has to be made by the agency or agencies with the appropriate jurisdiction. Ideally, the reviews and analyses preceding the decision will have generated a favorable, interagency consensus on its merit and a cooperative attitude that will extend into the implementation phase.

Step Eight—Decision Implementation

Resource management decisions will be implemented by one of three groupings of agencies: one of the NRMCA signatories; two or more outside agencies; or a mix of outside and NRMCA agencies. USAF or USFWS approvals of, or cooperation in, outside agency actions must precede any activity on Range or Refuge lands.

Step Nine—Monitoring and Evaluation

An important component of the administrative-management framwork will be monitoring and evaluation of the environmental effects of an action. Participants in this process should include the NRMCA agencies, other agencies (for example, ASPB), and, possibly, special interest groups (for example, the Arizona Wilderness Coalition). Monitoring by outside agencies will probably be on an issue-by-issue basis. Similarly, special interest groups may perform watchdog functions for issues germane to their particular purpose.

Although the framework decision-making process is issue-driven, the monitoring routines of NRMCA agencies should not be confined to land areas or resources of current interest only. A broadly based resource monitoring program is needed to understand and prepare for present and future issues. Funding and personnel time sufficient for comprehensive monitoring is unlikely to be available, but a system using presently available data (from all sources) and agency field patrols could be designed to provide adequate background coverage. Two approaches for monitoring are presented in Chapter 2 of the NRMP.

Resource Management Staff

Employment of a professional resource staff within the USAF (four positions at LAFB), is critical to the operation of the administrative-management framework and, thus, to the successful implementation of this NRMP. Without the resource staff, the framework will not have the leadership necessary to coordinate resource management actions on LAFR. Also, the Air Force will not have the expertise re-

quired to participate as a full partner in NRMCA. As a corollary to the staff at Luke AFB, one or two complementary positions should be established at MCAS, Yuma, so that the USN/USMC may also participate fully in the NRMCA and this NRMP.

The duties of the Air Force resource staff and their counterparts at Yuma will be multiple. In addition to obligations associated with the administrative-management framework, the staff will be responsible for implementing this NRMP and fulfilling the military's environmental protection requirements.

The ability of resource personnel to complete their assignments will be dependent on their professional expertise. Consequently, their credentials must be on par with those held by professional land managers in the USFWS, BLM, or AGFD. The composition of the staff must also represent the special management needs of LAFR. Subsequent to the following review of management functions is an examination of the credentials that should be required for each position.

Management Functions

Eight categories of management functions have been identified for discussion purposes. In practice, these responsibilities will not be distinctly separated, but blend into one another to a large degree. The resource management staff at LAFB will perform major duties in all of these categories. Personnel stationed at Yuma will not have the overall management responsibilities of the Air Force staff, but will perform important corollary work. The eight categories are agency responsibilities, NRMP administration, decision-process coordination, decision-implementation coordination, monitoring, clearinghouse operation, in-the-field management, and education and training.

Agency Responsibility. One of the most important responsibilities for the resource staff will be to insure that the military agencies fulfill their environmental obligations. As previously noted, both the USAF and USN/USMC have been periodically deficient in meeting these obligations, largely because they have not had appropriately trained personnel. Once the staff is in place, they can use this NRMP as a basis from which to approach their respective agencies in environmental affairs.

NRMP Administration. The resource management staff at Luke AFB will be the principal administrative body for the NRMP. The Plan has been designed to direct the cooperative efforts of NRMCA agencies by establishing basic resource management goals and procedures. Implementation will require administration and leadership by the resource staff.

Coordinate Decision-making Process. Coordination of the process for interagency decision-making will be one of the specific administrative duties of the resource staff. This process and the step-by-step roles of the staff have been described above. Yuma personnel will take the strongest interest in the process as it pertains to the Yuma Segment.

Coordinate Implementation. Regardless of how a management decision is to be implemented, the resource staff will play a significant role in directing necessary cooperative efforts.

Monitoring. The resource staff should take the lead in developing an adequate system to monitor baseline environmental conditions on LAFR (see Section 2.4). The staff should also make sure that specific procedures are described in plans for new land uses or management actions that will insure detection and proper surveillance of any resulting impacts. To some degree, the absence of any systematic or consistent monitoring programs for LAFR has, in the past, prevented recognition of individually small but cumulatively significant resource impacts. The effectiveness of the new administrative-management framework will depend to a great degree on the ability to avoid this past mistake.

Resource Management Clearinghouse. The clearinghouse concept, as a tool for the identification of management issues, is described in Chapter 2 of the NRMP. The resource management staff will have the responsibility of managing the issues clearinghouse.

Field Management. With the implementation of this NRMP, the management involvement of the USAF and USN/USMC will increase significantly and will include more field work. Resource reconnaissance for planning purposes, road survey and siting, recreation management, archaeological clearances, environmental monitoring, and ventures in interagency cooperative management are examples of field work to be undertaken by the military. The resource staff will be responsible for coordinating and performing these functions.

Education and Training. Military agencies inherently experience high personnel turnover rates. As a result, persons having little or no familiarity with deserts often initiate and participate in Range-related activities that could have environmentally damaging consequences. The resource staff should play an important role in establishing and maintaining programs to inform or train military personnel as to procedures to protect the desert from unwarranted impacts.

Resource Management Staff Expertise

Challenges facing the resource staff will require expertise in a broad array of management and administrative fields. To function, the staff will, collectively, need skills in resource management and planning, interagency coordination, environmental and resource law, general administration, information and data management, various resource management specialties (for example, wildlife, public use, and archaeology), and environmental interpretation and education. Collectively, these types of professionals represent a level of expertise that might be found on the staff of a BLM or Forest Service district, with support from their upper administrative levels. Obviously, the military will not be in a position to assemble a staff with expertise equivalent to that of their counterparts in these federal land management agen-

cies. The comparison remains valid, however, as recognition of the complexity of the LAFR resource management situation.

Because the Air Force is responsible for the leadership role in this framework, personnel with resource planning, administration, and management abilities to serve as overall program directors and coordinators of actions conducted through the framework will be required. A secondary personnel need is in wildlife and cultural resource management. Wildlife are one of the most important and certainly among the most visible resources on the Range. A manager in this field is needed by the Air Force to coordinate with the USFWS and AGFD. A specialist in cultural resources would also fill a management niche that is missing for the entire Range (CPNWR included). Additionally, a number of other resource specialities should be acknowledged as having importance to the Range. Personnel specializing in land use encroachment, water and geologic resources, and outdoor recreation would all be important assets to the management staff.

As an important adjunct to the LAFB staff, personnel at MCAS, Yuma should be selected to augment overall resource management on LAFR and facilitate USN/USMC environmental obligations. Toward these ends, persons with broad backgrounds in resource planning and management should be hired.

Management Philosophy. All personnel selected for LAFR resource positions must have an understanding of the fragile nature and conservation requirements of the Southwestern desert. These individuals must also realize that LAFR is a unique area in which traditional management priorities and methods are often constrained by legal mandates and multiple agency jurisdictions. Military pilot training will continue to have the highest priority and resource conservation practices must respond to and, as much as possible, compensate for the resulting impacts. The aggressive manager whose approach may be intensive resource modification and development will be frustrated by conditions associated with LAFR because of the access restrictions imposed by military use and the fact that intensive manipulation is generally inappropriate in the fragile desert environment. Most natural processes in the desert occur at a naturally slow pace and positive benefits can only be achieved by subtle, carefully planned action and great patience. Resource damage, on the other hand, is easily accomplished, and is often nearly impossible to correct.

The most appropriate resource conservation policy on LAFR is one of preventing damage. Impacts are going to continue to occur within this area, and are generally going to exceed the natural capacity of the environment to compensate. Therefore, the best alternative for management is to fully understand these environmental limitations and give priority to conserving those areas and resources most critical to maintaining the natural productivity of the area. Such conservation will occur most effectively through cooperative planning with military and other users of the Range. Managers who understand and can effectively operate in such a situation will enjoy an opportunity to contribute significantly to land and resource conservation on LAFR.

Position Descriptions. The following are specific descriptions for positions at Luke AFB and MCAS, Yuma. These are civilian positions. The use of civilian professionals will establish expertise and consistency in resource management not available through transient military personnel.

Resource Management Director, Luke AFB. This individual is to be the director of the resource management staff at Luke AFB. A strong ability in integrated, resource planning and management is the most important criterion for selecting a candidate for this position. The individual should have a broad appreciation of military operations and wide experience in natural resources to provide an appropriate balance of attention to all management issues. Skills in administration, interagency relations, land use planning, public land and resource law, and information management will be important. The individual selected for this position must understand, in particular, the importance of the conservation management philosophy.

Assistant Resource Director/Planner, Luke AFB. The credentials of this individual should closely parallel and complement those of the director. This position is necessary to provide a second perspective, often critical in resource planning, and to cope with the work load that will face the staff. Skills in administration and information management could be emphasized in this position to augment the organizational abilities of the staff. A thorough understanding of NEPA processes will be very helpful.

Wildlife/Resource Manager, Luke AFB. The significance of wildlife as a resource issue on LAFR warrants placement of a specialist on the staff. Among other duties, this individual will act as a liaison with the USFWS and AGFD. This position will be pivotal in coordinating the cooperative and individual efforts of all agencies involved with wildlife. In addition to wildlife responsibilities, the individual would be expected to participate as a general resource manager. Therefore, a broad-based, natural resource background will be important.

Cultural Resource Manager, Luke AFB. A cultural resource manager is needed to provide planning and management expertise in an important area. This person should have a professional background in Southwestern archaeology. The cultural resource specialist will also participate in comprehensive management with other staff members.

Resource/Public Use Manager, Yuma. This position will be the primary resource management post at MCAS, Yuma. This individual should have a broad background in natural resources, in order to respond to a variety of planning and management issues. Because the Western Section under USMC jurisdiction is the most accessible public use sector of the Range (outside of CPNWR), assignment of a specialist in this area is appropriate. This person would be expected to work closely with the staff at Luke AFB on general management issues and provide public use expertise to the Air Force when needed.

Assistant Resource/Public Use Manager, Yuma. This individual should have credentials that support the Resource/Public Use Manager. A second person is required at Yuma to address the magnitude of environmental planning, conservation, and public use challenges that the USAF and USN/USMC must jointly face in the Yuma Segment.

Contractual Services

Management issues are going to arise that pertain to surface or ground waters, geologic or vegetation resources, land use encroachment, environmental law, etc. These will often necessitate outside expertise, in addition to that available in NRMCA agencies. One method of acquiring such assistance may be through continuing, or periodic contracts with outside consultants. The consultants would work under the supervision of the resource staff, at Luke AFB, with appropriate input from the other NRMCA agencies. Ideally, a frequently needed consultant could be retained on a long-term basis to provide reliable, consistent services, as needed. A continuing contract would allow a productive rapport to develop between the consultant, with long-term knowledge of the issue, and the resource staff.

Interagency Cooperation

Cooperation among NRMCA agencies and others has permitted important exchanges of resource information and expertise. Such cooperation should be encouraged whenever

possible. Formal channels for this type of exchange have been provided by NRMCA. The effectiveness of this agreement will be enhanced under the leadership of the resource staff and through the use of the administrative-management framework supplied by this NRMP. Other formal or informal cooperative management arrangements should be promoted by the resource staff, where such agreements would be beneficial to LAFR.

1.5 RESOURCE MANAGEMENT SYNOPSES, GOALS, AND RECOMMENDATIONS

The role of the USAF, as the central authority for resource management, and the recommended decision-making framework for management have been reviewed in the preceding section. The following is a presentation of the resource management goals and recommendations for LAFR. The goals appearing here are in the same sequence as the chapters contained in the NRMP, the corresponding NRMP chapter is identified for each management topic area. Preceding each goal is a synopsis of the topic. Following each goal are recommendations for resolving the problems presented in the corresponding chapter.

Administrative-Management Framework (Chapter 2)

Development of an effective management system for LAFR's resources has been impaired by the complex agency jurisdictions and missions that apply to the area. Most importantly, until this NRMP, no central authority, goals, or decision-making process for resource management have been formulated for the Range. Fortunately, current land uses have, to some degree, supported resource conservation. Limited conservation has occurred, however, because potentially damaging land uses (such as, livestock grazing, mining, and agriculture) have been largely excluded by military activities within the Range. Conversely, military use has also resulted in some of the most disruptive environmental impacts. Individually, these impacts may appear relatively scattered and insignificant, but cumulatively they become significant, especially when coupled with damages from nonmilitary activities. The conditions of the land-use and conservation balance on LAFR are shifting as changes occur in the types and intensities of Range uses. Much more affirmative control of resource management is necessary, if environmental losses on LAFR are to be minimized or prevented. Further, the need for such control is legally mandated. The best approach for implementing an affirmative program of resource management for LAFR is the planning system outlined in this NRMP.

Presently, the USAF has no personnel trained in natural or cultural resource management. To rectify this situation, the Air Force has entered into cooperative agreements, including NRMCA, to gain the assistance of the USFWS, BLM, and AGFD in managing LAFR's resources. These agreements do not, however, constitute a formal management structure for the Range. Due to the lack of a formal, administrative-management framework, overall management of the natural and cultural resources of LAFR remains inadequately directed and coordinated.

A major component of this Plan is the development of an administrative-management framework for directing overall management of the lands and resources of the Range. The framework offered here provides a systematic planning approach to comprehensive resource management that incorporates the collective inputs of the NRMCA agencies and other informed sources. The USAF is placed in the pivotal role of providing leadership and coordination for framework functions. A professional resource staff, hired by the military will provide the Air Force and USN/USMC with the expertise to perform this vital leadership role.

Goal

Manage LAFR resources through an integrated management framework by which agencies can coordinate current and future resource issues and actions in ways that are compatible with natural and cultural resource goals.

Recommendations

2-1. Implement management goals outlined in this NRMP as the basis from which to plan and execute all natural and cultural resource management activities on LAFR.

2-2. Formally adopt the administrative-management framework proposed by this NRMP (Figure 1.2), as the systematic means of coordinating multiple and individual agency activities directed toward the conservation and management of natural and cultural resources on LAFR.

2-3. Establish a resource staff at Luke AFB and resource management personnel at MCAS Yuma, to serve as an administrative team for the implementation of this NRMP, and to provide continuing leadership and coordination for management framework functions.

2-4. Require that all ground-based activities on LAFR receive prior approval from the USFWS or USAF, to ascertain the compatibility of those activities with environmental conservation and agency missions. A proposed action could be denied or deferred for

modification on the basis of incompatibility with either of these conditions.

2-5. Use the decision-making process stated in Recommendation 2-2 to evaluate the environmental implications of actions proposed for the non-Refuge portion of LAFR, or actions that will affect both Refuge and non-Refuge resources.

2-6. Develop an issues clearinghouse, to be administered by the resource staff, that will provide all agencies involved in the decision-making process with up-to-date information on the progress of various management issues.

2-7. Develop a central reference system (under the administration of the resource management staff) for library materials and resource data bases to be used by all agencies and parties involved with LAFR.

2-8. Establish an appropriate monitoring system under the direction of the resource management staff to provide routine surveillance of selected resources and land areas, as a means of monitoring baseline trends.

2-9. Initiate a program directed by the resource management staff at Luke AFB and their colleagues at MCAS Yuma, to educate military and other appropriate personnel on the environmental consequences of various activities, the means of avoiding damage to natural and cultural resources, and the mitigation of unavoidable environmental impacts.

Land Status (Chapter 3)

Land status refers to the collective legislative and administrative designations applied to, or proposed for, lands within the boundaries of Luke Air Force Range. These categories are important, because they influence or directly determine land ownership, agency jurisdiction, expenditure of management funds, land use activities by LAFR agencies and the public, and basic land and resource management perspectives. Approximately, a dozen military and nonmilitary land withdrawals have been issued for various areas within the present boundaries of LAFR. Existing designations follow:

- Within the Range boundaries are the 822,000 acres of CPNWR (861,000 acres in total area) withdrawn in 1939 and 1975, and reserved for wildlife preservation.
- State lands leased by the military total 84,262 acres. In 1985, the state was paid $255,788 for the use of those lands.
- There are 2,675 acres of scattered private lands throughout LAFR. Of this acreage, 2,025 acres are leased outright and 650 acres are leased under condemnation, a process which must be repeated every five years.
- At least 200 mining claims have been established; these were filed before the Range was withdrawn from mining and mineral entry.
- Prior to World War II, five mining districts were established by groups of miners, based on levels and types of mining activity.
- Mineral Districts are official land area classifications established by the USGS; there are four on the Range.
- Parts of three counties (Yuma, Pima, and Maricopa) cover the Range.
- The Arizona Game and Fish Commission has divided LAFR lands into four Wildlife Management Units.
- Three areas that contain endangered, rare, or peripheral species, or represent outstanding examples of a natural ecosystem, have been designated state natural areas—through a Letter of Understanding from the State Parks Board and the Air Force.
- Four research natural areas (RNA) have been designated by USFWS on the Refuge. An RNA is a land unit in which current natural conditions are maintained insofar as possible.

Proposed special designations are listed below:

- The creation of a Sonoran Desert National Park was proposed in 1965; it would have consisted of all lands in Organ Pipe Cactus NM, CPNWR and the proposed Tinajas Altas addition to CPNWR.
- Biosphere Reserve status has been proposed by UNESCO to cover the area proposed by the Sonoran Desert National Park. The objective of the program is to recognize and protect representative and unique ecological regions and major ecological subdivisions.
- Several areas within LAFR have been proposed by the public as Areas of Critical Mineral Potential (ACMP). ACMPs are areas of mineral potential recognized by the BLM.
- The creation of a Sentinel Plain State Natural Area was considered in the late 1970s. Since the early 1980s, there has been no action on the proposal.
- The addition of 79,000 acres of the Tinajas Altas Mountains to CPNWR is under active consideration.
- The creation of a Yuma Dunes State Natural Area, approximately 100,000 acres in size, is being discussed.
- The description of CPNWR as a Wilderness Area is under active consideration.

The above complex of existing and potential classifications of lands within the Range requires the LAFR resource staff to keep informed about changes in land designations, and to analyze any impact such changes in land status may have on

cultural and natural resources, as well as on the military mission.

Goal

Promote continuation of LAFR as a natural resource reserve through military withdrawal and appropriate land use designations.

Recommendations

3-1. Assure that all LAFR agencies gain a better understanding of the legal meanings and requirements of existing withdrawals affecting the Range, and communicate with each other regarding their responsibilities for the withdrawals.

3-2. Assure that the anticipated Congressional withdrawal for the Range appropriately reflects the unique land use, resource protection and management requirements of the Range.

3-3. Negotiate with the State Land Department, regarding the exchange of state lands within LAFR for federal lands outside the Range.

3-4. Investigate the possibility of purchasing private lands within LAFR.

3-5. Monitor proposed land designations within LAFR, for example, Wilderness, and comply with the legal and policy mandates associated with such designations.

3-6. Inform all LAFR agencies and the public of the location of areas protected by special designations, and how land-use activities are circumscribed by these designations.

3-7. Provide information about the purpose, location, and exact boundaries of specially designated state natural areas and federal research natural areas to all LAFR agencies and minimize activities in those locations.

3-8. Keep all personnel fully informed as to the location in which ground activities and development may or may not occur.

3-9. Verify the status and location of unpatented mining claims within the Range.

3-10. Communicate promptly to the public and other agencies, as necessary, new designations for land use, resource protection, safety, and security.

3-11. Verify the location of specific boundaries of research natural areas and state natural areas within the Range.

Geologic Resources (Chapter 4)

LAFR, located within the Basin and Range physiographic province, is characterized by a series of northwest-southeast trending mountain ranges separated by broad valleys, deeply filled with alluvium (transported erosional materials). These

traits are the product of several mountain building events separated and followed by the erosional forces of an extremely arid climate. Collectively, the geologic resources of the Range present varied ecological, aesthetic, and potential economic values. This rugged terrain also provides an important setting for military aircrew training. Geologic resources are essential to the ecology of LAFR, as they provide the basic physical materials that support the biological components of the environment. Altering the geologic base will result, at least locally, in severe environmental impacts.

Prior to withdrawal, a number of small and moderately sized mines and prospects were developed in the LAFR area. For 45 years LAFR has been closed to further mineral exploration and development because geological exploration and development activities are incompatible with military operations. Although the available information indicates that the economic feasibility for mineral development on LAFR is low in the forseeable future, this conclusion is somewhat tentative. Considerable subsurface geophysical data remain to be analyzed. Approximately one-sixth of the Range must still be field-surveyed. Consequently, the reliability of current estimates of economic potentials remain in doubt; hence, contingencies to deal with the possibility of mineral development should be formulated.

LAFR could remain closed to mineral development into the future. In this case, management of the geologic resources

should focus on ecological and aesthetic values. Economic development will remain as an inactive, but possibly important future issue. Conversely, the Range could be opened to mineral development, if Congress alters the current withdrawal status and management agencies approve development proposals. Within this scenario, possible economic gains must be carefully weighed against adverse and often irreversible impacts to the environment and geologic resources, and possible interference with the military mission.

Goals

Minimize human-induced acceleration of geological processes and unnecessary damage to landforms and soils.

Should LAFR lands be opened to mineral and geothermal entry, manage mineral, oil and gas, and geothermal exploration and extraction, so as to be compatible with military missions and natural and cultural resource goals.

Recommendations

4-1. Keep LAFR closed to geological exploration and development because of the far-reaching impacts these activities would have on the natural and cultural resources of the Range.

4-2. Conduct a reconnaissance assessment of the geologic and mineral resources west of Longitude 114 degrees West (the El Centro quadrangle), in a manner similar to the recent USGS study of the Ajo and Lukeville quadrangles.

4-3. Adopt the following procedures relating to geological assessment and mapping of field-related activities, and any future geological exploration or development activities that might occur if the withdrawal status is modified to permit geological exploration and development.

(i) Geological exploration or development should not occur within CPNWR, state natural areas, federal research natural areas; or any other nondesignated environmentally sensitive area where wildlife, vegetation, or cultural resources might be adversely affected.

(ii) To the greatest extent possible, all field activities relating to geological exploration or development should be limited to established roadways. Any off-road field work must receive appropriate environmental clearance.

(iii) A detailed map and description of any proposed field work activities, including transportation routes, campsites for field crews, and occupation times should be provided by the contractor and approved by the LAFR resource management staff in consultation with other appropriate agencies.

4-4. Develop a systematic, readily available data base containing all hydrologic, geologic, and geophysical studies conducted on LAFR, (identical to Recommendation 5-5, see Recommendation 2-7).

4-5. Consider special protection for that portion of the Sentinel Plain volcanic field within LAFR because of its unique geological features, and because the area has been previously proposed as a state natural area.

Water Resources (Chapter 5)

Because LAFR is located in one of the most arid regions of the world, the relatively sparse number of surface waters found on the Range are extremely important. Some wildlife are dependent on surface water for their survival. Further, some surface water locations may hold potential for archaeological study. Surface water sites may also be highly valued for recreation experiences and human survival. Most surface water catchments on LAFR were formed by geologic processes prior to the entrance of prehistoric humans on the Range. Over the past few decades, the USAF, AGFD and USFWS have reconstructed and actively managed most of the natural water catchments, and have built many artificial catchments.

The shallow ground water resources of LAFR have played an important role in surface water development. The earliest wells were probably dug in the mid-1800s. Travelers, ranchers, and possibly miners depended on these ground water developments for their survival. Today, the military installations and neighboring communities also rely on ground water. As full appropriation of Western surface waters occurs, ground water will become increasingly important as a source of untapped water. In addition to containing some shallow aquifers, LAFR's deep alluvial basins may also have potential for large-scale development. The extent of aquifers underlying LAFR is, however, unknown at present.

In light of the important role surface waters have played in wildlife management, and the important role ground water plays in the the arid Southwest, three general management problems can be defined: (i) the need for continued protection of the quantity and quality of surface waters; (ii) the need for managers to investigate and prepare strategies for potential, large-scale, ground water development; and (iii) the need to protect ground water quality.

If the ground water resources are developed, there will be a need to develop management strategies to cope with several potential problems: (i) environmental impacts from ground water exploration and development activities; (ii) continuous decline of ground water tables that could adversely impact surface water resources and riparian vegetation, as well as possibly lead to land subsidence and fissures; and (iii) potential lawsuits if ground water development or degradation within LAFR adversely affects hydrologically connected ground water basins in perimeter areas. There is also a possibility that ground water development outside of the Range could impact the natural resources of LAFR.

A reconnaissance of the major ground water basins in the Range is needed to assess their potential for development. Surface waters need to be identified and mapped, development plans for military or other purposes must not jeopardize the quantity or quality of these waters. Research is also needed to resolve the controversy over the value of developing wildlife waters on the Range. More information is also needed to ascertain the legal mechanisms with which potential user groups could apply pressure for ground water development. Policies would then need to be developed to mitigate environmental impacts and disruption of agency missions, if large-scale ground water development were to occur. Every effort should be made to protect the quality of the ground water.

Goal

Manage LAFR water resources to preserve existing natural ecosystems, and accommodate agency needs within LAFR to the extent they do not jeopardize those ecosystems.

Recommendations

5-1. Prohibit ground water exploration or development or both on the CPNWR for off-site uses.

5-2. Prohibit ground water exploration and development in designated State Natural Areas, Federal Research Natural Areas and other environmentally sensitive areas where wildlife, vegetation or cultural resources might be adversely affected.

5-3. Conduct a reconnaissance assessment of the ground water resources in the Yuma Desert Basin, Lechugilla Desert Basin, Mohawk Valley Basin, San Cristobal Valley Basin, Crater-Sauceda Valley Basin, and in the Sauceda-Sand Tank Valley Basin.

5-4. Limit all field activities relating to ground water exploration and development to designated roadways to the greatest extent possible. Any off-road fieldwork requires an appropriate environmental clearance and should follow the prescribed fieldwork guidelines (see Recommendation 4-3).

5-5. Develop a systematic, readily available data base containing all hydrologic, geologic, and geophysical studies conducted on LAFR (identical to Recommendation 4-5, see Recommendation 2-7).

5-6. Register all wells within LAFR with the Arizona Department of Water Resources.

5-7. Keep informed of new federal and state water laws which might allow outside groups access to LAFR ground water.

5-8. Monitor the water table levels to determine how perimeter water use may be affecting water reserves on the Range.

Soil Resources (Chapter 6)

Desert soils, in general, and those found on LAFR in particular, are not suited for intensive human activity. They are easily disturbed, highly susceptible to erosion, and slow to recover after disturbance. Many soils have fragile desert pavements and other easily disrupted protective crusts. Scantily vegetated surfaces are susceptible to wind and water erosion. According to Soil Conservation Service (SCS) ratings, LAFR soils have varying suitability for uses, such as recreation, community development, water management, and agriculture. Unfortunately, in the absence of data from on-site surveys, only general evaluations of suitability can be made at this time. Such evaluation will have to be made on a site-by-site basis as potential projects are considered. For now, the best way to achieve the goal of minimizing human-induced impacts, and to maintain the stability and productivity of the Range's soils, is to carefully control all activities that disturb land surfaces.

Goal

Minimize human-induced acceleration of geologic processes and unnecessary damage to land forms and soils.

Recommendations

6-1. Restrict the operation of motorized vehicles and other heavy equipment to established roadways and other previously impaeted areas to proteet vegetation, desert pavements, and other proteetive eovers of soils from disruption.

6-2. Assess, as part of site appraisals for the NEPA evaluation process (that must precede initiation of new land-based activities), the vulnerability of soils to disruption and subsequent wind and water erosion.

6-3. Update the soils map database with new information colleeted during site evaluations.

6-4. Using the following techniques, minimize soil disturbance and conserve soil resourees where intensive use of a previously unimpacted site is required:

(i) gain access to the site by means of existing roadways;

(ii) use equipment that minimally disturbs soils (sueh as, rubber-tired vehicles rather than tracked vehicles);

(iii) confine vehicle use to the smallest area neeessary to accomplish the task at hand; and

(iv) reelaim soils as necessary and revegetate impacted sites with loeal, native species after use has ceased.

6-5. Prohibit all land-based activities that disturb the vegetative covers of the Superstition and Rositas series, as they are especially vulnerable to wind erosion.

Vegetation Resources (Chapter 7)

LAFR lies near the northern edge of the Sonoran Desert, considered the riehest of the North American deserts in terms of the number of life forms and variety and development of plant eommunities. Vegetation resourees on LAFR are ecologieally important in that they represent relatively undisturbed populations of native Sonoran Desert vegetation, eontain rare and unusual plant species, provide essential food and eover for wildlife, and minimize the impaet of erosional forces (human or natural) on LAFR lands. Limitations on public access have left large tracts of land in a relatively undisturbed, natural state, but military and other uses have had a heavy impact on the vegetation resources of the Range. Beeause of the scarcity of rainfall and the fragile nature of desert soils, vegetative reeovery in disturbed areas can be extremely slow or nonexistent.

The impaets of various land uses could, over time, result in considerable loss of native vegetation, disrupt natural sueeession, and destroy wildlife habitat. Without the stabilizing effects of vegetation, erosion could become a significant management problem. With inereasing use of the Range, espeeially eonstruetion and maintenanee of new roads, reloeation and addition of targets, installation of defensive missile systems, development of wildlife waters, and the use of heavy ORVs for ground-based training in air defense and eombat, disruption of plant communities and loss of plant speeies will beeome more prevalent.

Preservation and protection of plant communities and species diversity will require cooperative management attention. Currently, there are no specific programs for vegetation management. Plant resource problems are addressed in terms of their significance to habitat management for wildlife. (The USFWS and AGFD are primarily responsible for wildlife management.) As the use of LAFR intensifies, the need for a concerted approach to vegetative resources management increases. Agencies need to assess the impacts their separate and joint activities may have on LAFR vegetation. These assessments should become an integral part of planning for all ground-based activities.

Goals

Insure the protection of plant communities and species diversity.

Insure attainment of the objectives of federal and state laws and regulations regarding threatened and endangered flora and fauna.

Recommendations

7-1. Give high priority to protecting vegetation from disturbances during any land-based activities.

7-2. Include a comprehensive vegetation survey as part of the required NEPA process prior to any development and intensive use of an area.

7-3. Utilize newly gathered botanical investigations to update the vegetation map developed for this Plan.

7-4. Develop a systematic database containing currently available botanical information, into which newly acquired data can be added in order to assemble a comprehensive survey of vegetation resources over time.

7-5. Adhere to the intent of the Arizona Native Plant Law, Endangered Species Act (ESA), and all other applicable laws and regulations to protect the vegetation resources of the Range.

7-6. Develop a Range-wide fire management plan similar to CPNWR's, that makes fire-suppression decisions on the basis of threat to human life, property, or endangered and threatened species. The plan should include participation by the USAF, USMC, BLM, and USFWS.

Wildlife Resources (Chapter 8)

Wildlife resources on LAFR are diverse, complex, and of critical importance to the health of the ecosystem. At least 62 species of mammals, over 200 species of birds, 5 species of amphibians, and 37 species of reptiles occur, at least occasionally, on the Range. Management of wildlife by the USFWS and AGFD has focused primarily on game species, especially desert bighorn sheep and the endangered Sonoran pronghorn antelope. Yet, game species represent only a

small fraction of the wildlife present on the Range; nongame species are far more numerous. Comprehensive wildlife inventories are needed to provide a better understanding of the diversity and complexity of the wildlife resources on the Range, so that the military can adequately consider wildlife in their land-use decisions.

Maintenance of wildlife habitat is critical to the continued diversity and population strength of wildlife. A number of activities threaten Range habitats. Off-road vehicle travel and expanding military facilities destroy vegetation and disrupt soils which, in turn, affect wildlife. Occasional trespass grazing increases the competition for forage and also represents a potential source of disease transmission to wildlife. Among various forms of wildlife management on the Range are water hole development, hunting, and predator control. Water hole maintenance is a major management emphasis of AGFD and CPNWR for desert bighorn and Sonoran pronghorn. A vigorous water development campaign has resulted in over 66 managed wildlife waters within LAFR. The ultimate effect of such habitat manipulation on the LAFR ecosystem is still largely unknown. Hunting is a popular form of recreation on LAFR, but because of the access restrictions adequate supervision of this activity is difficult to achieve. The extent of illegal hunting activities is not at all well known. Predator control has been a controversial topic and has been used sometimes on non-Refuge lands as a wildlife management tool.

Goal

Insure the protection of wildlife habitats, species diversity, and viable populations.

Recommendations

8-1. Any implementation of predator control on LAFR should be preceded by thorough discussion among LAFR agencies, research specific to LAFR documenting predator-prey relationships, and a complete NEPA (National Environmental Policy Act) review.

8-2. Establish the taxonomic validity and distribution of the Yuma Puma (*Felis concolor browni*) before any addi-

tional harvest of mountain lions in the USMC sector of LAFR occurs in order to avoid possible violation of ESA (Endangered Species Act).

8-3. Couple all future water hole development projects with research programs designed to determine the impact of such development on targeted species as well as on other species that may be affected. Precede such developments with a complete NEPA review.

8-4. Comply with NEPA and ESA regulations for all wildlife projects.

8-5. Evaluate the cumulative impacts of land disturbances on wildlife habitat in order to establish criteria for protection of critical habitat when making land-use decisions.

8-6. Establish comprehensive wildlife inventories and monitoring programs of game and nongame species to provide information that should guide land-use decisions.

8-7. Establish an international research and recovery program with Mexico as outlined in the 1982 USFWS Recovery Plan for Sonoran Pronghorn antelope.

8-8. Eliminate all trespass grazing by livestock (cattle), goats, and feral animals (burros).

8-9. Develop a five-year wildlife management plan (in accordance with AFR 126-1, chapter 5, section B) to protect, conserve and manage wildlife resources on non-refuge sections of LAFR, with the assistance of the USFWS and AGFD.

Atmospheric and Visual Resources (Chapter 9)

Because the primary military mission on the Range is aircrew training, the favorable climate and air quality of southwestern Arizona (which provide year-round flying conditions) were key factors in the location of this aviation facility. Precipitation, which falls during well-defined summer and winter rainy seasons, is minimal, from about three inches annually in Yuma to nine inches in Ajo. Air temperatures are characterized by extreme heat in the summer months, with maximum daily means exceeding 100 degrees Fahrenheit. Freezes occur only occasionally during the winter. Winds are mild, averaging only a few miles per hour.

Air pollution is a continuing problem on lands adjacent to the Range. The areas surrounding Yuma and Ajo do not meet federal standards for particulates due to fugitive dust. Until the Phelps Dodge Corporation closed the copper smelter in Ajo, that area frequently exceeded the standards for sulphur dioxide. Recorded air pollution in these areas suggests that some of the Range has been similarly affected. OPCNM and CPNWR have been designated as Class II airsheds. Because much of LAFR shares a common airshed with these areas, activities authorized there must generally not exceed the federal standards for Class II designation. Visual resources refer to the types of views that can be seen in any given area. Due to NEPA and FLPMA, these resources must be given equal consideration with others in decision-making. Military and nonmilitary activities and remnants of these activities can detract from the area's aesthetic appeal, as can air pollution originating on or off the Range.

Goals

Protect or enhance existing LAFR air quality.

Protect or enhance the integrity and diversity of LAFR's visual resources.

Recommendations

9-1. Monitor air quality trends as documented by perimeter air quality stations.

9-2. Control excessive fugitive dust generated on heavily traveled roads and at construction sites and activity areas.

9-3. Prevent further degradation of the visual resource by confining military uses of LAFR to existing disturbed and impacted land areas wherever possible.

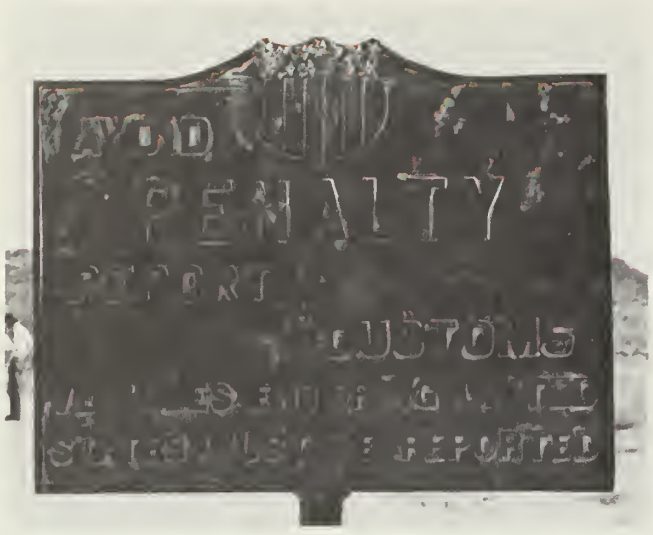
9-4. Protect mountain vistas from visual intrusions.

9-5. Protect the visual quality from lands adjacent to El Camino del Diablo recreation corridor and highways (Interstate 8 and State Route 85).

9-6. Leave errant tow targets where they have fallen unless removal methods can be found that do not damage natural and cultural resources.

Cultural Resources (Chapter 10)

Human use of LAFR probably began between 11,000 and 12,000 years ago. Remains of these early hunting and gathering people consist largely of stone tools, cleared circular areas on the ground, trails, rock-pile shrines and rock alignments. During the last 1,500 years prehistoric Indian groups called the Patayan and Hohokam used the Range primarily for hunting and gathering purposes, as well as



crossing it on shell trading expeditions. Pottery made by these peoples is relatively common on the ground surface. Spanish explorers were the first Europeans to visit the Range when they crossed El Camino del Diablo (the Road of the Devil) in the mid-16th century. They encountered small bands of Indians who spoke a Piman language and were related to the modern-day Pima and Tohono O'Odham (formerly called the Papago). In historic times, the Range has had three principal, nonmilitary uses: as a travel corridor, for mining, and for ranching. El Camino del Diablo was the major corridor used to connect California with northern Mexico, and later with Ajo and Tucson. Mining ventures were most successful on the western periphery of the Range and at Ajo. Most ranches were headquartered east of the Range, but a few were located within the Range boundaries.

Information of considerable cultural importance exists on the Range. Of prehistoric age are numerous trails, rock art sites, and short- and long-term campsites containing a wide variety of artifacts. Abandoned mines and ranches contain information of historic interest. Available information suggests that upper bajadas and areas near primary washes are most likely to contain prehistoric cultural resources. Lower bajadas and mountain slopes are less likely locations. Cultural resources are suffering from a variety of impacts from both military and and nonmilitary activities. The following recommendations are made to protect the cultural resources and bring their management into compliance with federal laws and regulations.

Goal

Protect the archaeological and historical resources of the Range and provide for continued study.

Recommendations

10-1. Provide for an archaeologist as part of the LAFR resources staff, as stipulated in the draft Air Force Regulations for Historic Preservation. (For details of the position see Chapter 2.)

10-2. Produce a cultural resource management plan applicable specifically to LAFR. Maintenance of such a plan, which the Air Force designates a historic preservation plan, is required by draft Air Force Regulations for Historic Preservation.

10-3. Coordinate management of cultural resources on nonrefuge portions of LAFR with the cultural resource goals of OPCNM and CPNWR.

10-4. Develop a systematic and comprehensive inventory program, carefully designed to maximize useful information while minimizing cost.

10-5. Require a comprehensive archaeological investigation prior to development and use of all areas, as defined in Section 106 of the National Historic Preservation Act of 1966.

10-6. Provide special protection for archaeologically significant sites and surrounding areas that are being impacted by both the military and public. (See Appendix 10-B for a site tabulation.)

10-7. Minimize impact on cultural resources by locating ground-disturbing activities and new developments away from known archaeological sites, preferably in already impacted areas. Lower bajadas have been found to be the least culturally sensitive and should receive primary consideration in site planning.

10-8. Implement an education program for military and agency personnel and, if possible local civilian populations, that will promote increased sensitivity to historic preservation, as directed in draft Air Force Regulations for Historic Preservation.

10-9. Inform field personnel about the location of cultural

resources and appropriate avoidance procedures when land-disturbing activities take place in archaeologically sensitive areas, as directed in draft Air Force Regulations for Historic Preservation.

Road Network and Off-road Use (Chapter 11)

The first roadways on LAFR appeared several centuries ago. The majority of the 2,000 to 2,500 miles of roads have been built, however, since World War II. More roads are being established every year in the absence of any comprehensive planning which considers the associated array of potential impacts on Range resources. Varying considerably in design, construction, and use, many of the roads are necessary for agency missions and safety needs. Nonetheless, roads exist that unnecessarily duplicate the functions and routes of other roads. Such duplication should be eliminated.

Off-road use has negative effects on the natural and cultural resources of LAFR. The Range is, therefore, closed to off-road use. Exceptions to the closure are subject to the requirements of NEPA and other laws and regulations. Despite the closure, unauthorized or improper off-road use does occur at various locations and resource impacts from this use continue to mount. The following recommendations are intended to promote policies of road and off-road management and use that demonstrate appropriate consideration of the natural and cultural resources of the Range.

Goals

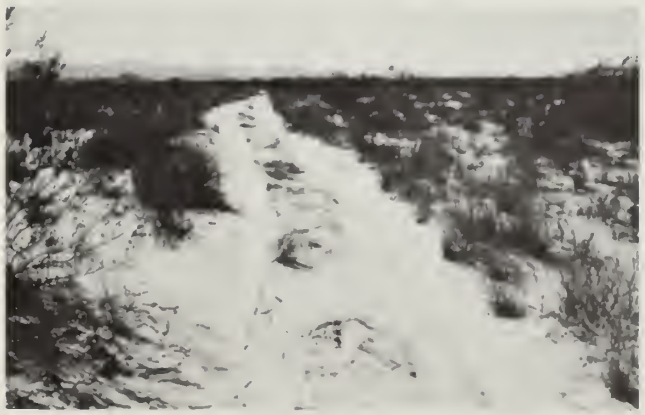
Allow for use of LAFR consistent with natural and cultural resource goals and military missions.

Maintain a road system sufficient only to meet safety and agency management needs.

Recommendations

11-1. Plan all future road development on non-Refuge lands, as well as road maintenance, as per NEPA procedures, and comply with environmental and resource protection laws and regulations.

11-2. Establish the LAFR resources management staff, in consultation with other agencies, as the central planning and management authority for roads on non-Refuge portions of LAFR.



11-3. Reduce to an absolute minimum any new road development by all agencies.

11-4. Coordinate agency and public access needs closely in Refuge and non-Refuge portions of LAFR to avoid conflicts or replication in road development, use, and management.

11-5. Maintain a comprehensive inventory of road mileages, locations and classifications in order to facilitate management of an appropriate road system, building on the base map developed by the NRMP.

11-6. Identify and clearly post which roads are open and which are closed to public use, using a method similar to that of USFWS.

11-7. Close those roads that are unnecessary to meet clearly identified agency missions and safety needs, and allow the roadbeds to recover to their natural character, rehabilitating sensitive sites as needed.

11-8. Communicate road and vehicle use rules to all Range users.

11-9. Prohibit public and agency off-road use on all LAFR lands as per USAF and USFWS regulations except in designated activity areas and in emergency situations.

11-10. Authorize off-road use only after the requirements of NEPA and other environmental and resource protection laws and regulations are fully met.

11-11. Clearly communicate to the public and agencies that the Range is closed to off-road vehicle travel, and any all-terrain vehicles that are not steet legal.

11-12. Use existing roads whenever possible to retrieve downed aircraft. The recovery should be conducted to provide maximum possible protection of vegetation, soils, and other natural and cultural resources.

Military Agencies (Chapter 12)

LAFR is used jointly by the U.S. Air Force, Army, Navy, and Marine Corps, and serves some pilots of allied nations. Since 1941, the military has expanded the size of the Range, increased the scope and complexity of training programs, and developed testing facilities for basing ICBMs. The Range is also a candidate for a permanent ICBM defensive weapons installation. Military withdrawal for the past 45 years has left parts of the Range among the last vestiges of well-protected Sonoran Desert. As military use pressures increase, due to a larger demand for training opportunities from other military installations, and the principal training thrust changes to accommodate permanent weapons installation, the quality of the resource may diminish. The following recommendations are designed to enhance careful planning and a coordinated, resource management program for LAFR and for continued uninterrupted use of the Range by the military.

Goal

Allow for use of LAFR consistent with natural and cultural resource goals and military mission.

Recommendations

12-1. Coordinate resource management functions more efficiently with military operations, giving regular briefings and supporting documents (AFR 50-46 and Sta O 3710.6 EV) to nonmilitary LAFR agencies, to appraise them of current and future military operations on the Range.

12-2. Use the expertise of NRMCA agencies and the resource management staff to evaluate the consequences of current and proposed military training and development on the cultural and natural resources of LAFR.

12-3. Evaluate all modifications, new developments, proposals for weapons installations, and re-use of previously closed sites in accordance with the NEPA process and all applicable laws and regulations relating to the affected natural and cultural resources.

12-4. Restrict military activities in State Natural Areas to travel on designated roads only; other military maneuvers should be prohibited.

12-5. Add specific wording to all field orders that address training activities, target maintenance and repair, new construction, and data gathering directing field personnel to minimize impacts on the cultural and natural resources of the Range.

Nonmilitary Agencies (Chapter 13)

A combination of 35 federal, state, and local agencies have either direct or ancillary responsibilities on the Range. Most agencies have tangential jurisdiction and, therefore, are rarely involved in LAFR issues. Two signers of NRMCA, the USFWS and AGFD, have specific responsibilities for wildlife and have active management programs on the Range. Several agencies have law enforcement responsibilities on LAFR lands including the U.S. Border Patrol, U.S. Customs

Service, Arizona Department of Public Safety, and the county sheriff's departments. The Border Patrol is the most active on the Range.

Agency activity is often limited by military-imposed access restrictions, particularly in the Gila Bend Segment. The Yuma Segment is rarely closed to agency access east of the Gila Mountains. While cooperation is good on a "request" basis, limited interagency information exchange occurs. Because many of the resources of the Range are fragile and multiple agency use is frequent, communication between primary users of the Range is necessary to insure that the need and procedures to protect cultural and natural resources is understood. Although individual impacts on Range resources may be minimal, collective agency impacts can be significant. The complex nature of each agency, with individual missions and mandates, requires an integrated approach to successfully manage and protect the resources of LAFR, as well as facilitate agency needs.

Goals

Allow for use of LAFR consistent with natural and cultural resource goals and military missions.

Provide for continued access to LAFR by state and federal agencies to accomplish their respective missions.

Recommendations

13-1. Establish biannual Range users' meetings with representatives from Luke AFB, Gila Bend Auxiliary Field, BMO, MCAS Yuma, USFWS, AGFD, Drug Enforcement Agency, U.S. Border Patrol, U.S. Customs Service, National Park Service, and Arizona State Parks Board, to provide briefings on military training and current needs of each agency. Discuss in detail issues of concern to each agency, needed interagency cooperative efforts, resource protection procedures, and resource impacts caused by agency actions.

13-2. Provide all field personnel with agency contact lists for reporting observations of unlawful incidents, resource impacts, unusual wildlife or vegetation observations, cultural resource finds and/or disturbances. Document observations and send the reports to the resource staff at Luke AFB or the appropriate law enforcement agency.

13-3. Provide more flexible access periods to the Range for natural resource agencies in order that they may implement long-range and immediate management objectives.

13-4. Keep LAFR agencies updated on status, location, and boundaries of specially designated areas including State Natural Areas and Federal Research Natural Areas.

13-5. Provide information to all LAFR agencies about known federally designated endangered and threatened species, and state special element species that inhabit the Range. The USFWS and AGFD have the primary responsibility for updating candidate and recognized species lists, and educating other LAFR agencies.

13-6. Provide information to all LAFR agencies of known and potential archaeological sites so that the agencies can minimize activities in those areas. (These locations are not for public dissemination.)

13-7. Request all agencies to monitor other agency and public activities on the Range and advise the resource management staff (with documentation) of the impact such activities may be having on the natural and cultural resources, particularly if the activities are unwarranted or within specially designated or protected areas.

13-8. Keep all LAFR agencies updated about federal and state regulations, laws, and acts that are written specifically to protect natural and cultural resources, and see that the requirements of such regulations, laws, and acts are properly followed.

13-9. Provide updated versions of USFWS manuals and plans and AGFD management policies and plans to the resource management staff at Luke AFB.

13-10. Acquire from the U.S. Border Patrol, U.S. Customs Service, county sheriff's, and Department of Public Safety operations manuals for the resource management staff; update manuals annually.

Outdoor Recreation Use and Management (Chapter 14)

LAFR serves as a local day-use and regional weekend recreation area. People hunt, picnic, camp, and drive to enjoy the area and its natural resources. Recreation is permitted by the Air Force as an incidental or secondary use. This use is subject to the overriding military missions for which the Range was established, as well as to safety, environmental, and resource management considerations. Primary responsibility for recreation resides with the Air Force on non-Refuge lands and with the USFWS for CPNWR. On the western section of the Range, the USMC administers public access on behalf of the USAF. AGFD is responsible for hunter compliance with state game laws and regulations; hunting is, however, limited by access restrictions.

A primary issue for outdoor recreation on the Range is safety. For more than 40 years, ordnance ranging in size from .50-caliber machine gun rounds to 2,000 pound, high-explosive bombs has been fired or dropped at numerous locations, many of which went unrecorded. There is some live ordnance on the ground surface and buried live ordnance may be widespread. Other safety considerations include extreme summer temperatures, lack of water, and hazardous mine shafts.

Another issue is security, because a number of classified defense training and testing projects take place on LAFR. For national security purposes, recreation access to certain areas must be periodically or permanently curtailed or prohibited.

Protection is needed for both the fragile environment of the Sonoran Desert, with its distinctive plant and animal species, and cultural resource sites containing evidence of both historic and prehistoric activity. As a responsible steward for lands under its control, the military is obligated to allow only that recreation use appropriate to the types and conditions of the resources found within the Range, and to wisely care for those resources for future generations. Air Force regulations require development of an outdoor recreation plan (subject to the overriding military mission for which the Range was established) to meet public demand. The following recommendations are made to foster outdoor recreation use of the Range in a way that supports the military missions and recognizes the natural resource and cultural goals set by this Plan.

Goal

Allow for use of LAFR consistent with natural and cultural resource goals and military missions.

Provide for continued public access and recreation to the extent compatible with agency missions, public safety, and natural and cultural resource protection.

Recommendations

14-1. Establish a professional position in natural resource recreation as part of the resource management staff.

14-2. Investigate the possibility of using volunteers for recreation support positions following the models of the U.S. Forest Service, and National Park Service.

14-3. Standardize requirements and documents employed in authorizing public access to the Range.

14-4. Utilizing various media, communicate Range access rules and procedures more effectively to the public.

14-5. Enforce consistently the rules of public access for the Eastern, Western, and Cabeza Prieta NWR Sections of the Range.

14-6. Update as necessary the resource classification system discussed in Section 14.3, and incorporate these classifications and related resource protection requirements whenever any new management or development actions are proposed.

14-7. Annually update the recreation land classification maps establishing point locations for the smaller Class IV (closed) areas represented by electronics installations and training facilities, as well as newly identified natural and cultural resource sites that may need to be closed for protection purposes.

14-8. Provide special protection, as required by federal and state law and USAF regulations, when managing for recreation or other land use in Class III ares. These areas include CPNWR, State Natural Areas, Federal Research Natural Areas, primary habitat of Sonoran Pronghorn, water holes, and cultural sites.

14-9. Develop and maintain better visitor use records that include statistics on user populations, visitor perceptions, and recreation use patterns.

14-10. Use traffic counters strategically placed and rotated among different Range access roads to show to what extent various roads are used to enter the Range.

14-11. Implement more fully the protection measures for public safety discussed in Section 14.10, including warning visitors of existing and potential resource and military hazards.

14-12. Clearly communicate to visitors the hazard of off-road travel in LAFR because of the presence of surface and buried live ordnance. Actively enforce the prohibition against off-road recreational travel.

14-13. Interpret to visitors the damage caused to soils, vegetation, cultural resources, and wildlife by off-road

travel as a means to enlist their cooperation in staying on designated roads.

14-14. Communicate to visitors the vehicular rules that apply to LAFR.

14-15. Monitor more closely hunting and trapping activities to determine accurate levels of participation, areas of use, and harvest levels.

14-16. Prohibit trapping in locations where military use and closures do not allow daily access by trappers.

14-17. Give consideration to implementation of a special permit and fee program for hunting and trapping as required by USAF regulations.

14-18. Put into effect a well-developed action plan for interagency involvement in search and rescue to cover incidents involving recreation visitors (see Section 14.10).

14-19. Appropriately manage the recreation aspects of the Range by adopting and implementing the Limits of Acceptable Change (LAC) system (see Section 14.11) and Recreation Opportunity Spectrum (ROS) (see Section 14.12).

14-20. Adopt formally, and communicate to the visiting public, rules of conduct as presented in Section 14.13 of the NRMP.

14-21. Review for consistency, accuracy, and completeness, and correct as necessary, Station Order 3600.4D (USMC) and associated documents.

14-22. Establish at Gila Bend AFAF and at MCAS Yuma a visitor contact center at which visitors may receive appropriate clearance briefings and documents.

14-23. Implement a well-organized and maintenance-conscious signing program; perimeter and interior signs are needed to notify visitors and agency personnel of the location of LAFR boundaries, rules of access, road closures, sensitive resource areas, safety considerations, and hazard locations.

14-24. Monitor fuelwood collection along recreation road corridors to insure that use does not seriously deplete important natural habitats.

Perimeter Land Use and Encroachment (Chapter 15)

Bordered by Mexico to the south, the Tohono O'Odham Reservation and OPCNM to the east, and farms, ranches, and a growing metropolitan area to the north and west, LAFR is not isolated from surrounding influences. Although a 440-mile boundary with fences and signs separates LAFR from its neighbors, interactions take place that can result in negative impacts on the natural resources of the Range. Such

interactions are termed encroachment or perimeter pressures. Encroachment takes two forms—direct and/or indirect.

Direct pressures result from activities on the perimeter of the Range that directly impact the LAFR environment. Examples include pesticide drift from local farms, air quality deterioration from neighboring smelters, trespass grazing by cattle, and drawdown of ground water levels by pumping on agricultural and metropolitan developments. Indirect pressures impact LAFR's resources through intervening mechanisms. Most prevalent are those that cause the military to alter its pattern of operations on the Range, which, in turn, can impact the natural resources. Relocation of target sites in response to noise and safety problems with developing perimeter communities is an example of an indirect pressure.

Both direct and indirect pressures are likely to increase and pose additional problems over the 20-year span of this plan. Indirect pressures are, however, rapidly becoming the most critical. The loss of usable airspace in other parts of the nation is crowding the airspace over LAFR with more training missions. Consequently, increases in noise and safety conflicts with perimeter areas residents can be expected. This intensification of LAFR's training schedule is in conflict with the burgeoning urbanization of the Yuma area, including retirement and winter home development in areas adjacent to the Range, and the Tohono O'Odham Tribe. The Tohono O'Odham people are already hostile to continued use of the airspace over their reservation. These pressures could cause significant modification of military operations.

Protection of LAFR's resources from perimeter influences entails maintenance of military stewardship over currently withdrawn lands, and vigilance for perimeter activities that could conflict with the resource management goals established in this NRMP. The Air Force will need to function more as an interested landowner by monitoring the Range perimeter for potential pressures and influencing local and regional land use decisions that may otherwise interrupt its mission.

Goal

Promote mitigation of perimeter pressures that may jeopardize or impact LAFR resources.

Recommendations

15-1. Initiate and continue liaison contacts with the agencies and municipalities that manage perimeter lands to circumvent perimeter pressures (direct or indirect), before they become perimeter problems that may affect the natural resources and military mission of the Range.

15-2. Monitor the acreage and distribution of agricultural land use in perimeter areas and technological advances in agriculture that might increase agricultural demand for arid lands and potentially encroach on LAFR.

15-3. Monitor stocking rates on perimeter grazing allotments and maintain a list of names, addresses, and brands of permitees to be able to respond to trespass grazing.

15-4. Maintain or construct fences where trespass grazing is a problem.

15-5. Obtain a list of perimeter land owners to facilitate communication when necessary.

15-6. Work with the county agricultural extension agents to determine the extent and danger of pesticide drift into the Range and any associated water quality problems.

15-7. Recognize that any shift in flight patterns stemming from conflicts with the Tohono O'Odham Indian Tribe could have an impact on the LAFR environment.

15-8. Monitor all geophysical and legal aspects to ground water management for any potential changes that may impact the natural resources on LAFR.

15-9. Monitor the Yuma City and County planning and zoning meetings to keep apprised of changes that may directly or indirectly affect the natural resources and the military mission of the Range.

15-10. Develop a media clipping file to monitor changes in use of perimeter lands and public perceptions of issues pertaining to LAFR.

15-11. Monitor changes and growth of Yuma and other communities along Interstate 8 and communities in Mexico adjacent to the Range to anticipate any perimeter pressures these populations may generate.

15-12. Expand existing community public relations programs to inform citizens about military and LAFR missions.

15-13. Initiate and maintain communication with SARH (Secretaria de Agricultura y Recursos Hidraulicos) and SEDUE (Secretaria de Desarrollo Urbano y Ecologia) in Mexico to monitor changes and trends in border region land use.

1.6 ADDITIONAL COMPONENTS OF THE NRMP

Chapters 16, 17, and 18 of the NRMP present materials that will be of assistance to LAFR's resource managers. Chapter 16 is a resource management directory having three key parts. First is a listing of agencies involved with the Range including frequently needed office addresses and telephone numbers. Second, the missions and associations of these same agencies with LAFR are identified. And third, a compendium of the resource issues addressed throughout the NRMP has been assembled. Issues are organized in a format that allows the user to identify an issue (for example, trespass grazing), briefly review its current status, and determine the relationships of various agencies to the issue. This system is designed as a quick reference for all agency personnel who must deal with LAFR in some capacity. Periodic review and maintenance of the directory will update its usefulness into the future.

Chapter 17 reviews the necessity and advantages of information management for resource management efficiency. The data and documents library and computer mapping system used for the NRMP development process are outlined, with recommendations for adapting these techniques for ongoing management.

Chapter 18 describes, in detail, the process used to develop the NRMP. Included are discussions and outlines of the various planning concepts that helped formulate the Plan. These techniques should be incorporated in the updating process discussed below.

1.7 UPDATING THE NRMP

Although the NRMP was developed for a 20-year period, the need for periodic updating of some portions of the Plan can be anticipated. To a large degree, the issue status-board and clearinghouse functions (outlined in Chapter 2, NRMP) will keep agencies well informed of current management concerns, directions, and programs without formal revision of the NRMP. Should a formal revision of the Plan be necessary, responsibility for that effort would fall to the resource staff at Luke AFB. The specific techniques required for revision have not been outlined here, but an issue-driven approach, as used in the preparation of this NRMP, would be appropriate. Depending on the scope of the needed revisions, the administrative-management framework described herein (Figure 1.2) should provide an appropriate format for the planning process. Planning process concepts outlined in Chapter 18 should be of assistance. The NRMP binder was selected to permit insertion of new or revised materials.